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No. 21

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CONTENTS

PAGE

EDUCATIONAL PSYCHOLOGY

- Intensive Foreign Language Training Method Introduced
(Boris Stanilov; SOVETSKAYA MOLDAVIYA, 20 Dec 77). 1

ERGONOMICS

- Application of System Approach in Ergonomic Investigation
(N. G. Alekseyev, A. B. Shein; TEKHNICHESKAYA
ESTETIKA, No 8, 1977) 3

FORENSIC MEDICINE

- Identification of Individuals in Forensic Medical and
Criminological Practice With the Use of Mathematical
Methods and Computers
(S. A. Gasparyan, et al.; SUDEBNO-MEDITTSINSKAYA
EKSPERTIZA, No 4, 1977) 14
- Possibility of Defining a Close Firing Range According
to the Size of Powder and Lead Deposits Using the
Method of Statistical Analysis
(I. Ya. Kupov, et al.; SUDEBNO-MEDITTSINSKAYA
EKSPERTIZA, No 4, 1977) 20
- Distinctive Morphological Signs of Intravital and
Postmortem High-Altitude Decompression
(I. M. Alpatov, et al.; SUDEBNO-MEDITTSINSKAYA
EKSPERTIZA, No 4, 1977) 23

CONTENTS (Continued)	Page
A Device for Photographic Superposition of Skull and Face Pictures (O. V. Filipchuk; SUDEBNO-MEDITSINSKAYA EKSPERTIZA, No 4, 1977)	29
Distinctive Features of Entrance Hole Region After Firing From an AKS-74 5.45 MM Caliber Submachine Gun at Ranges of Up to 30 CM (Yu. P. Sysoyev; SUDEBNO-MEDITSINSKAYA EKSPERTIZA, No 4, 1977).....	32
GENETICS	
Recent Advances in Genetic Engineering Discussed (V. Kordyum; PRAVDA UKRAINY, 21 Oct 77)	36
Contributions of Genetics to Various Fields of Knowledge Noted (N. Dubinin; SOVETSKAYA LITVA, 12 Nov 77)	39
ONCOLOGY	
Carcinogenic Substances in the Environment and Prevention of Malignant Tumors (L. M. Shabad; VOPROSY ONKOLOGII, No 10, 1977)	43
PLANT PATHOLOGY	
Septoria of Winter Wheat Crops in the Ukraine (S. N. Kovalenko; ZASHCHITA RASTENIY, No 9, 1977)...	56
PSYCHIATRY	
Estonian Psychiatrist Discusses Sixth Congress of Psychiatrists (Yu. Saarma Interview; SOVETSKAYA ESTONIYA, 1 Oct 77)	58
PSYCHOLOGY	
B. F. Lomov Discusses the Work of the Institute of Psychology (B. Lomov Interview; OBSHCHESTVENNIYE NAUKI, No 1, 1978)	62
SCIENTISTS AND SCIENTIFIC ORGANIZATIONS	
First All-Union Conference on Animal Radioecology (A. I. Il'yenko; USPEKHI SOVREMENNOY BIOLOGII, No 5, 1977)	72
Accomplishments of Bulgarian Institute of Zoology Discussed (B. Botev, V. Golemski; ZOOLOGICHESKIY ZHURNAL, No 10, 1977)	76

EDUCATIONAL PSYCHOLOGY

INTENSIVE FOREIGN LANGUAGE TRAINING METHOD INTRODUCED

Kishinev SOVETSKAYA MOLDAVIYA in Russian 20 Dec 77 p 4

[Article by Boris Stanilov: "Foreign Language in 3 Months"]

[Text] What student of a foreign language would not want to acquire the skills of conversational speech in a short time, 3 months for example? An experiment conducted by the Moscow Laboratory of New Methods of Foreign Language Training of the Central Scientific Research Institute of Communications has the goal of confirming such a possibility. It is based on work by the Bulgarian psychotherapist Georgiy Lozanov.

Laboratory director Candidate of Philological Sciences Galina Kitaygorodskaya explains that a Bulgarian physician has introduced psychotherapeutic procedures into education. His work is based on the notion that the potentials of human memory are unlimited. This means in application to foreign languages that the volume of training material offered in one lesson could be increased significantly, from the traditional 10 or 20 new words to 200! Lozanov called this phenomenon "hypermnnesia," or supermemory.

Muskovites developed their own version of Lozanov's system in 1975. The goal they posed to themselves was threefold--teaching, within a short time, specialists (engineers, teachers, and so on) to, first, give lectures in their specialty in one of the foreign languages, second, read technical and literary works, and third, converse freely in the foreign language.

...The lights are dimmed. Music plays softly.... Color slides of a spring forest, meadows, and fields are projected onto a wall-sized screen.... Students sit in a semicircle of soft chairs before the screen.

The lesson begins, with Marina Mayorova teaching. This is not simply a lesson but a carefully thought out and outstandingly played out show.... The lessons are subdivided into three cycles. The first is the "tourist" cycle, as is said in the laboratory, or the basic cycle. Its goal is to teach the students to understand and maintain a conversation on "day-to-day human" subjects. The cycle consists of three lessons, with four academic hours

devoted to each. By the end of the first cycle the students will master 2,000 (!) lexical units and will begin to not just simply talk in the foreign language but also employ a broad range of conversational constructions and idioms in their discussion.

Language improvement begins in the second stage. Preference is given to monologues in contrast to the dialogs dominating the first cycle. The linguistic material is different as well.

Beginning his study of the language, each of the students is given an arbitrary name which remains with him throughout all of the lessons. Thus in the English group engineer Petrov becomes Mr. Black, in the French group technician Sokolova becomes Mme. Francoise, and in the German group division chief Semenov becomes Herr Kramer. All "remained" in Moscow throughout the first cycle. The students did not have to tax their attention and memory, "acting in an unfamiliar country." But now they are "sent" to England, France, the FRG, and the GDR together with their "guides." They gradually change their impressions, and they begin to "work themselves into the image." The subjects of the discussion include the education, culture, history, and geography of the country. In the second stage, the reading of adapted literature is introduced into the program as well. As a result the students learn another 2,000 lexical units within the same time interval.

The third cycle is called the "sublanguage" cycle here. Its orientation is toward the narrow specialization of the students. The laboratory is within the communication institute, and correspondingly the linguistic material reflects the specialty of the institute. Now the students begin reading original literature. Eighty hours are devoted to this cycle.

By the end of the training the students have facility with about 6,000 lexical units. They talk about any subject suggested, and they read special and literary works.

There is one other positive aspect of the new method--psychosocial. The students are given an injection of pleasure during the lessons. Music, lights, and slides help the individual to switch his attention from day-to-day affairs and concerns to a new wavelength. Constant reliance upon the native language, the game situation at the beginning, and the jokes make it possible to avoid even minor stresses. Four hours of intense mental activity takes the form of effective intellectual and psychological "gymnastics."

Serious attention is being devoted to the study of foreign languages in our country. Just among "organized" students--schoolchildren, university students, and students in specific courses--we have not less than 35 million. Naturally, it would be impossible to calculate the number of people studying independently or with the help of television. Our method, which is similar to Galina Kitaygorodskaya's variant, is being used by more than 30 groups and departments. An interdepartmental council on the problems of the intensive training method has been established with Academician Aleksey Leont'yev at its head. In the opinion of specialists, the future calls for coordination of such experiments on an international scale.

ERGONOMICS

APPLICATION OF SYSTEM APPROACH IN ERGONOMIC INVESTIGATION

Moscow TEKHNIЧЕСКАЯ ЭСТЕТИКА in Russian No 8, 1977 received by editors
25 Apr 77 pp 10-13

/Article by N. G. Alekseyev, candidate of philosophical sciences, and A. B. Shein, philosopher, All-Union Scientific Research Institute for Aesthetic Styling in Engineering/

/Text/ The problem of application of the system approach in ergonomics seems by no means trivial both for the practice of designing man-machine systems and for a theoretical generalization of the results of investigation of "human factors" (labor activity of operators of complex automated control systems). In a wider sense the application of the system approach in ergonomics constitutes a serious, but as yet insufficiently worked out logical and methodological problem of determining the specific characteristics of ergonomics as science.

As is well known, the term "system approach" pertains to the scientific orientation realized in specific investigations as a method of scientific and technical thinking, not as a special algorithm or a set of algorithms given to the investigator as a formal mathematical or logical apparatus (method, model and so forth). At the same time, an analysis of the development of system presentations from the standpoints of dialectical materialism shows the unsoundness of any attempts to depict the system approach in the form of some "philosophy of systems" not depending on specific research tasks.

"Ergonomics" is a concept no less general than "system approach." This is a wide sphere of practical and theoretical activity and a rapidly growing field of knowledge. V. P. Zinchenko and V. M. Munipov (11) define ergonomics as one of the directions of the system approach to the study of man in labor. Ergonomic recommendations for the development of effective man-machine systems are directed toward an increase in the productivity of labor processes and the preservation of the health and development of the personality of workers. With due regard for these explanations the problem of application of the system approach is naturally interpreted as a problem of the development of a program for system investigations in ergonomics. Many variants of coordinating the tasks and objects of ergonomics into a single

program on the basis of the system approach have been advanced. However, a satisfactory generally accepted variant has not yet been created. Moreover, this is hardly possible without a methodological analysis of the initial orientations of construction of such a program. In particular, the following examples can attest to the urgent need for such an analysis. For example, different variants of distribution of functions between man (operator) and machine (subsystems of automated control systems, auxiliary devices for the input and output of data, control consoles and elements and so forth) cannot be directly coordinated with each other owing to a substantive irreducibility of the initial premises of the disciplines constructing their system descriptions of an ergonomic object. The known attempts to construct a system of a universal criterion of the efficiency of man-machine systems on the basis of a theoretical and informational description, stochastic models, the graph theory (criterion trees), an ergatic interpretation of the operator's activity (based on a narrow cybernetic conception of labor activity as a system) and so forth can serve as examples of a direct solution of the problem (as the formulation of a ready program). As shown in the work by V. P. Zinchenko and V. M. Gordon [9], the failures of such attempts stem from a fundamentally reductionistic methodological principle. At times it is impossible to include significant psychophysiological structural components of the operator's activity in a single criterion and, ultimately, to formulate the criterion itself.

This article analyzes the present orientations of ergonomic investigation connected with the system approach. It is a question of singling out orientations from the point of view of the place held by them in the assumed program.

Ergonomics is an overall science. Overall nature as the most significant characteristic of ergonomic knowledge is noted by all Soviet and foreign investigators in this field [10, 14, 15, 17]. Naturally, the leading place in a wider context of the general problem of application of the system approach is assigned to the problem of synthesizing various possible approaches in the study of labor activity and in the designing of "man-machine" systems. During a methodological analysis it is important to single out the formed key approaches to the formulation and solution of the problem of synthesis. In our opinion, their explanation and consideration by investigators create the above-mentioned orientations. As is well known, in itself the methodological analysis by its nature can ensure only the formulation and solution of the problem (approach), but not the synthesis proper, which is the prerogative of a substantive ergonomic investigation of man-machine systems and presupposes a methodological analysis as the necessary condition.

We will examine the methodological situation formed in modern ergonomics at three levels: 1) "factological statement," that is, a direct reflection of the state of affairs in theoretical consciousness; 2) system presentations of the object of ergonomic knowledge; 3) organization of system principles according to three groups of initial orientations.

First of all, we will note what is called "factological statement." The practice of specific ergonomic work shows that the realization of each specific task (equipping a control console, designing a work place and so forth), as a rule, requires the enlistment of specialists in different fields, that is, psychologists, physiologists, anthropologists and so forth. Their work and contribution to the common cause must be coordinated. This very coordination of the efforts of scientists of various specialties is not such a simple task as may seem at first glance and represents a still unsolved general methodological problem [5].

The problem of synthesis attracts ever greater attention [7, 20]. For example, V. F. Venda proposes an outline for the solution of the synthesis problem on the basis of a distinctive fusion of three ideas: 1) the concept of ergonomic practice as optimization of man-machine systems; 2) disciplinary singling out of ergonomic factors; 3) the idea of corrective and projective stages of ergonomics introduced by V. M. Munipov [16].

"However, the approach accepted in corrective ergonomics presupposes in each case the examination and optimization of activity on an alternate basis according to individual types of factors: psychological (then the importance of the characteristics of anthropometric, physiological and hygienic factors is either considered optimal or is not taken into account at all), physiological, hygienic and so forth (with the same reservations). In conclusion such individual data are simply summed up" [8, p 270]. Noting the imperfection of this approach of corrective ergonomics, the author considers it necessary to change over to projective ergonomics: "The overall criteria of optimality used in projective ergonomics reflect the degree of the system's efficiency (productivity, accuracy and reliability) and its humaneness and correspondence to man's psychophysiology (safety for health, man's strain and fatigue level and the emotional effect of the process of labor on him). The criteria take into account the interrelated effect of psychological, physiological, anthropometric and hygienic factors determined by the appropriate parameters of machine and environment on man's activity" [4, p 272]. As can be seen from this excerpt, it contains only a general statement to the effect that disciplinary approaches should be interrelated. In other similar cases analysis is also limited to a statement of the situation formed in real ergonomic practice. Of course, with such an approach only the most abstract opinions of the problem can be expressed in the absence of its theoretical and methodological elaboration.

At the examined level of analysis quite definite steps in the development of the problems of synthesis can be found in the works by V. P. Zinchenko and V. M. Munipov [10]. "In ergonomics this methodological problem... assumes the form of the problem of compatibility in one experimental investigation of both different methods and techniques of interpretation of the obtained results" [10, p6]. And further: "In each of the sciences on which ergonomics is based and whose results it uses there are different methodological approaches, conceptual schemes and systematic methods of study and description of the same phenomena... When approving the suitability of

specific, previously formed conceptual schemes and methodological approaches for the solution of ergonomic problems, there is the need for their partial revision, supplements and changes" [10].

A theoretical formulation of the problem is envisaged, which is observed, first, in the processing of the conceptual schemes used in the sciences on which ergonomics rests on a new basis through their redefinition and adaptation to the specific nature of ergonomic problems; second, through the above-mentioned compatibility in research strategies and in the establishment of certain general principles and foundations in the conceptual schemes belonging to different fields of knowledge. Both these aspects mutually supplement each other and can be divided only in a theoretical analysis. Their efficiency can be observed briefly by examining the following theoretically important cases.

The scheme of activity by A. N. Leont'yev [13], which gained wide recognition in Soviet psychological science, proved to be insufficient and incomplete in the set of the units for an adequate description of the operator's labor proposed in it. From ergonomic standpoints it was subjected to change and was expanded greatly. It is important to note that the introduction of such a unit as the functional block [6] into the scheme of activity not only shifted the boundaries of psychological analysis of short psychic processes, but organically and naturally drew a series of new psychophysiological methods into it. Thereby, the problem of synthesizing various approaches (even if in a narrow aspect and only for a certain range of problems) proved to be partially soluble.

As already noted, the second aspect lies in a search for certain general principles and foundations in the conceptual schemes belonging to various scientific disciplines. The comparison of the theory of physiologist N. A. Bernshteyn [2] and psychologist A. V. Zaporozhets [8] made by N. D. Gordeyeva, V. M. Devishvili and V. P. Zinchenko [6] serves as an example of the heuristic value of such research. With a differentiation of the anthropometric, biomechanical, physiological and psychological approaches, the similarity of the concept of action as a kind of formed whole element was central there.

The examined aspects show that the realized objective and theoretical synthesis of various disciplinary approaches (on an already formed theoretical basis) serves as the starting point for applied ergonomic research on the determination of the configurations and sizes of the spatial motor field. It is important to note that psychological and anthropometric methods proved to be organically fused in the indicated research.

The third aspect important for understanding synthesis problems is connected with a direct discussion of the problem of designing coordinated external and internal activity facilities, primarily with the coordination of conceptual and information models fully utilizing the operator's psychological capabilities for the collection and processing of information and decision

making /17, p 70/. We have in mind the typology of the operator's activity /6, 15/. This research singled out four basic types of the operator's activity (activity of the observing operator, technological operator, research operator and managing operator) depending on the basic performed function and two types of relationships (the comparative proportion of the descriptive and conceptual component in human activity, as well as the share of the labor of man and machine).

In the aspect of interest to us (the synthesis problem) the present typology of activity is remarkable in the fact that it impels us to raise the problem of the possibility of various methods of unifying various investigations of the "man-machine" system. Differentiation of the types of the operator's activity gives a sufficient empirical and practical basis for such a turn of the general problems.

We recorded certain key aspects in the formulation of the tasks of a whole investigation: development of methodological principles of synthesizing various research systems of "man-machine-subject of labor-production environment." The summing up and connection of such principles gives the concept of the general problem formed during this period. Briefly, it can be reduced to the following.

Just as in ergonomic practice there are frequent cases of a simple arrangement of the work of experts in different fields and scientific specializations, so synthesizing is effected by means of processing the conceptual schemes of initial scientific disciplines on a new basis dictated by the specific nature of the problems solved by ergonomics. With regard to specific types of problems there are already cases of an efficient synthesis of various research methods (both intra- and inter-disciplinary). The diversity of the processes of labor activity analyzed in ergonomics inevitably leads to the formulation of the problem of developing the typology of synthesizing and the existence of several different types of unification of knowledge from various disciplines into a single ergonomic whole.

The successful attempts at synthesis connected with the introduction of new objective (ergonomic) concepts appear as the initial material for the application of the system approach in ergonomic investigation.

For a complete picture of the existing methodological situation it should be noted that all the principles or aspects of understanding the synthesis problem formulated above join or center in the special presentation of the object of ergonomic knowledge, that is, that to which, ultimately, knowledge refers. The "human factor" in technology, the labor activity of operators of automated control systems and the "man-machine" system by no means represent the complete list of the generally accepted names of the object of ergonomic theory. With all the differences in the specific aspects of research the object of ergonomic knowledge reveals primarily its own specific nature as a complete and whole formation. Presentation of the object as a system whole presupposes the task of separating it from the environment and

constructing a hierarchy of the levels of functioning, mechanisms of connections of various types and so forth. The system concept of the object enables the researcher to separate and synthesize the studied area of reality according to its rules as a complex whole formation.

It is precisely through understanding the object of study that all the other research problems are substantiated and connected. An appeal to the object always appears as an appellation to the most practical reality, whose reflection is knowledge /1/.

Therefore, it is natural that the presentation of the object of ergonomics as a system object "closes" various individual ideas of the ways of synthesis in ergonomic knowledge.

Let us now go on to the second level of analysis of man-machine systems as the basic object of ergonomic knowledge in its system sense.

In the history of ergonomic research it is possible to single out several "stages" in the formation of the concept of the "man-machine" system (for example, as a "technical cybernetic system" or a system of activity and so forth). In our opinion, their disclosure makes it possible to determine the specific ways of synthesizing ergonomic knowledge. They are different for different initial presentations of the "man-machine" system. We would like to add that during a systematic examination it is also important to determine to what extent the analyzed presentations of the man-machine system make it possible to develop the system principles of research. The possibilities of applying the system approach in ergonomics are examined at the third level. This question was often raised in the literature. For example, in the series of works of the All-Union Scientific Research Institute for Aesthetic Styling in Engineering *ERGONOMIKA* issue 8 (1974) was devoted to an investigation of the cognitive and executive activity by the methods of structural systems analysis. Moreover, it can even be stated that system ideas determine most of the important aspects of the theory of ergonomics which now cannot even be conceived outside system differentiations and orientations. The ideas and concepts of the theory of ergonomics intergrew, as it were, with them.

It is not so simple to determine what is the "application of the principles of the system approach" to ergonomics. One cannot but agree with the following statement: "Including the most diverse modern scientific and technical investigations in the category of system investigations, obviously, we proceed from the fact that these investigations are united by some principles common for them, which form the essence of the system approach. Today one would hardly undertake to fully categorically formulate a complete and final list of such principles" /3/. As we see, an outline of the situation with regard to the system approach is given here very widely. It is not only difficult to definitively single out the list of system principles, but also the very system investigations examined as a whole represent, as V. N. Sadovskiy notes, "...a variegated picture of various approaches, concepts, theories and developments" /18, p 248/.

It appears that the general state of affairs is also reflected in the extreme statements in which, in practice, the system approach is identified with any scientific approach. For example, the "system approach, system research, is not something fundamentally new, which has appeared only in the last few years. This is the natural and the only scientific method of solving both theoretical and practical problems used throughout centuries" [21, p 5].

Thus, quite an unclear and indefinite situation is formed. Criteria of the fact that in one specific investigation or another, in general, the system approach was applied are indefinite. Similarly, more narrow criteria of a specific application of its individual principles are indefinite (of course, generally recognized criteria are implied). At the same time, with the indicated operative indefiniteness of criteria almost all the researchers engaged in the problems of the system approach include certain specific investigations in the category of system investigations and, therefore, lean on similar general concepts.

"The system approach, or the system method, represents an explicit expression of the procedures of determination of objects as systems and methods of their specific system investigation (description, explanation, forecast, construction and so forth)" [18, p 27]. Here the essence of these general concepts is given perhaps in the clearest form: An investigation pertains to the system investigation when special procedures of presenting and understanding the studied object as a system object are constructed with a certain degree of awareness, or efforts are directed toward a system study and reflection of the object in knowledge. Undoubtedly, both these aspects in a specific study can be both separated and realized in a fused, undivided form. In our opinion, the thesis of the system approach as a general scientific methodological orientation was derived precisely from such a fixation of the general for various system investigations [21]. From here it also follows that depending on the author's objective interests (the problems he solves, scientific tradition and so forth) every attempt to formulate all the basic principles of the system approach turns out to be either trivially universal, or incomparably individual.

Not having the possibility and not considering it fundamentally necessary to formulate our special list of system principles for our investigation, we assume that it is quite sufficient to adhere to the following reference points, which make it possible to consider certain specific ergonomic investigations system investigations.

The first group of general reference points has an "external" nature to some extent. It pertains to the selection of quite a full concept of the system object. For example, an intrinsic whole system can be taken as the "maximal system." This concept, which for the first time was materialistically developed by K. Marx in the investigation of complex social and economic systems, was thoroughly analyzed in the methodological investigations by

V. P. Kuz'min, E. G. Yudin and I. V. Blauberg, V. N. Sadovskiy, V. I. Kremyanskiy, A. A. Malinovskiy and others and was also discussed in the periodical publications "Sistemnyye Issledovaniya" [System Investigations] [19].

The second group of general reference points, in fact, was described above. This is the presence of orientation either toward the system nature of the very process of investigation, or toward the system nature of the object, or both. The use of "paradigm" (a regulated set) of system categories and concepts, that is, system, element and structure, relations and functions, level and hierarchy of levels, external and internal environment and so forth, is a fully determined sign of the existence of such an orientation. Reference points, including the specific understanding of the object of ergonomics and a methodological problem of synthesis of various aspects of their investigation are directly connected with ergonomics.

In this connection two explanations are necessary.

First, man-machine systems taken in themselves are not only the objects of ergonomic investigation and designing, but also of other scientific and technical disciplines. First of all, what is customarily called the "human factor" in engineering [10, 14], that is, ultimately, even if very roughly, the activity of operators in these systems, is subject to ergonomic jurisdiction. The system presentation of man-machine systems for ergonomics is the system presentation of the operator's (human) activity in them. The system approach, which is manifested in ergonomics more and more fully, creates the prerequisites necessary for making the transition from the accumulation of data on human factors to an intensive study and a whole description of the structure of typical forms of specific activity [12, p 51].

Second, the extent to which this specific system presentation is attained realistically enters the competence of ergonomics. Here it is necessary to touch upon the differences between ergonomic investigations taken separately, as though in an isolated manner, and their combination as a whole. The general structure of ergonomic investigations has many components. It includes an investigation of individual aspects and features of the operator's activity (see, for example, the classification in "Ergonomics Abstracts"), presentation of the realization of overall ergonomic designing, and theoretical review works [7, 10, 14, 15, 17]. The whole presentation of the "man-machine" system begins to be especially substantiated and developed only in works of the last type, which orient more specific investigations, including them into a single system of ergonomic studies.

The third group of reference points is determined by the general task of this article. As already indicated, the initial task lies not in giving a certain "independent" objectivistic description of the application of system principles in ergonomics, but in initially formulating the problem of synthesis of various approaches in the investigation of man-machine systems, that is, in showing how a different view of the system object determines the peculiarity and qualitative difference of the possible approaches to synthesis. On

the basis of the groups of reference points introduced above it is possible to single out different types or modifications of the application of the system approach in ergonomics respectively. Understanding the "man-machine" system as a special kind of "technical system," interpretation of the object of investigation as a complicatedly organized activity and a system organization of the strategy of ergonomic investigation--all these concepts are of a preliminary working nature /1/ and the disclosure of their conceptual content is a matter for subsequent analysis.

The analysis conducted makes it possible to draw the following conclusions: 1) a system representation of the object of ergonomic investigations is primarily a theoretical and methodological task; 2) it is possible to single out a relatively small number of system presentations of the operator's activity corresponding to the basic theoretical and methodological orientations in ergonomics.

In conclusion, it should be noted that ergonomics represents a phenomenon extremely productive for the system approach. On the one hand, it is always connected with designing some specific type of activity or quite rigidly organized (around the operator's activity) combinations of activities and, on the other, the subject of ergonomics has a generalized nature and is aimed at singling out legally compatible characteristics for almost any production activity, as soon as a set of cognitive and executive actions and operations, information processing and decision making and preparation by man and so forth, a set connected in a certain way, can be singled out in it. Therefore, the recommendation on the optimization of one type of activity, but typical for the modern scientific and technical revolution--the activity of the operator of modern automated control systems--is the direct result of ergonomic investigation. In other words, with all the concrete and practical limitation of ergonomic recommendations they have a theoretical content exceeding the boundaries of narrow situations of their partial use.

In such a wider context the theoretical and methodological position or orientation in ergonomics cannot be considered self-sufficient if we limit ourselves only to its intrascientific interest. Its correct formulation requires consideration of the specific nature of the "technology" of scientific thinking with regard to the principles and orientations of the moral and value spheres of human activity. The horizon of the formulation of the problem of application of the system approach expands in this case. Therefore, the singled out orientations should be specified according to the place occupied by the tasks of ergonomics in the context of the tasks of systems engineering, systems design, aesthetic styling in engineering, ethical and aesthetic concepts of activity and so forth.

The circumstances noted attest to the significantly open nature of the problem of application of the system approach in ergonomic investigation. A more detailed analysis of the methodological characteristics of its formulation in the indicated circumstances concerns the further prospects for methodological

analysis in science, and in the sphere of ergonomic investigation, in particular. However, this is beyond the scope of the initial description of the orientations in the application of the system approach in ergonomics undertaken in this article.

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IDENTIFICATION OF INDIVIDUALS IN FORENSIC MEDICAL AND CRIMINOLOGICAL PRACTICE
WITH THE USE OF MATHEMATICAL METHODS AND COMPUTERS

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[Article by Prof S. A. Gasparyan, doctor of medical sciences; B. A. Fedosyutkin, candidate of medical sciences; G. Ya. Voloshin, doctor of engineering science, and V. T. Oleynikov, Second Moscow Medical Institute imeni N. I. Pirogov (head: Academician Yu. M. Lopukhin of the USSR Academy of Medical Sciences), and Central Criminological Laboratory of the USSR Ministry of Internal Affairs (director: G. G. Tsarev)]

[Text] Criminological medical identification of an unknown person is referable to the category of expert examinations, in which various mathematical approaches are being used more and more often (R. E. El'bur, 1965, 1967; Z. I. Kirsanov, 1970; N. S. Polevoy, 1970; M. M. Pyatkevich, 1974, 1976; N. V. Zavizist, 1970; A. N. Ratnevskiy, 1976; Furtmayer, 1975, and others).

We can distinguish several variants of identification of a person, in which some mathematical methods or other can be used: on the basis of photographs taken before death, in which the individuals are discerned according to age, photographing conditions and other factors (portrait criminological identification); according to photographs taken when the individual was alive and postmortem photographs taken to identify the corpse; according to the skull and photographs taken prior to death.*

The object to be identified is a person or unidentified corpse, and the identification objects are photographs of missing persons and the skull of

*This article does not deal with identification based on the dactyloscopic method, coinciding individual marks, stomatological status, etc. If there are minor changes in appearance of the corpse, identification is relatively simple. As a rule, preparation of the head of the corpse, a verbal description, photography and postmortem masks, dactyloscopy, inspection of clothing and personal articles, analysis of findings of external and internal examination to demonstrate individual, occupational, pathological and other distinctions yield the necessary set of identification information. But if there has been decomposition or destruction of the corpse and no material is available, with the exception of the skull and skeletal bones, the identification problem is more difficult and special methods are more important to its solution.

the unidentified corpse. All of the work can be done from photographs, if photos are taken of the head of the corpse, as well as the skull in the proper scale and perspective [foreshortening]. For this reason, it is expedient to discuss the methods of identification from photographs and the skull together.

At the present time, superposition of photos (photoapplication, superprojection) is the most popular method of identifying a skeleton. There are numerous works by forensic medical figures providing the theoretical substantiation and dealing with technical refinement of this method (S. A. Burov, 1957; Yu. M. Kubitskiy, 1957, 1959; E. A. Finn, 1957; A. S. Kravchinskaya, 1969; Debinski, 1974; Blaha, 1973 and others).

Although the photosuperposition method is technically simple and available to a wide spectrum of experts, it is laborious and has some appreciable flaws, such as lack of objective criteria for evaluation of results and the possibility of superimposing the photo of the skull over photos of a number of individuals. A precise conclusion as to the identity of the skull is possible only if superposition of photos can be done in several aspects, if there are distinct individual features on the skull and photographs and with coinciding additional features (stomatological status, serological data, etc.).

In 1965, a team of Latvian scientists (R. E. El'bur and others) proposed the method of graphic identification algorithms to make identifications from photographs. The algorithm of graphic identification (AGI) is based on the idea of a central projection, according to which two different photographs of some object constitute its central projections in different planes from different projection centers. A system of constant points is charted; then the isolated sets of constant points are transformed into broken lines, the graphic finders, by means of a system of graphic plots. Whether or not the examined photos are referable to the same object is determined on the basis of visual evaluation of the zone of scatter in the region of intersection of the lines connecting finder points with the same name.

In the opinion of A. Yu. Peresunkin (1972), the method is illustrative and permits comparison of photographs taken in different aspects; however, it is difficult to use it on a wide scale because of the complexity of geometric plotting and lack of quantitative evaluation of the scatter zone.

It is unlikely that efforts to upgrade the AGI method (A. N. Ratnevskiy, 1975, and others) by means of diverse modifications of plotting the finders will succeed, since a positive result is determined by an important condition: the skull under study must be photographed in the same aspect as the face. But, as we know from practice, it is very difficult to obtain such a consistency without verifying with slides (i.e., photosuperposition). Consequently, the AGI method or modifications thereof should be considered adjuncts to photosuperposition, that would permit more graphic illustration and evaluation of the results of identification.

In another work, A. N. Ratnevskiy (1976) proposed, when comparing full-face photographs of the face and skull reproduced in a life-size scale, to compare the constant points of the skull and face by orienting both in a common rectangular system of coordinates. A conclusion as to the identity of the compared objects can be made with no more than 2-3 mm fluctuations in distance between points with the same name.

N. S. Polevoy (1970) proposed an analytical method of identification on the basis of photographs, which is based on analysis of information characterizing the spatial and linear structure of the face. As in the case of the graphic identification algorithm, the analytical method makes use of a system of anthropometric points on the face, which are successively connected by segments of straight lines; the obtained patterns are then compared. However, as mentioned by the author, this method "requires further refinement" and checking.

Furtmayer (1975) developed a coordinate diagram method (CDM) of making identification from a skull. Additional [auxiliary] lines are plotted through 35 topographic anatomical points and then a coordinate diagram is plotted. The diagram can be coded, and the code can be classified; in the opinion of the author this opens up the possibility of using the results of the CDM method in card files (for primary sorting). The author considers it expedient to combine the CDM, photosuperposition and plastic reconstruction of the face from the skull.

M. M. Pyatkevich (1965-1976) developed a probabilistic statistical method of evaluating the morphological correlations between the skull and head by comparing photographs thereof. In essence, the method consists of measuring absolute and relative sizes of projections of parts of the face and skull on the photographs; then, by calculating the coefficient of correlation, the degree of relationship between the measured sets of features is evaluated. He established experimentally that the differences between the following analogous measurements on the face and skull are of the greatest value for identification purposes: points on the mouth and chin; point above the bridge of the nose and point under the nose; bridge and point under the nose; point above the bridge and the bridge; lateral canthi of the eyes and point above the bridge; lateral canthi of the eyes and point on the chin; distance between lateral canthi and length of right and left rimae.

Z. I. Kirsanov (1962, 1970) tried to make a comparative study of photographs on the basis of analysis of relations of linear dimensions of one part of the face (forehead, nose, chin, etc.) to the linear dimensions of other parts of the face. This approach has an important advantage: it permits examination of photographs regardless of scale.

N. V. Zavizist (1970) used angular measurements in consideration of quantitative features on photographs of the face. This method can be used when an expert examines photographs of the face that were made in accordance with the rules for identification photography. "Coincidence of all angular indices on the compared photographs" is the basis for concluding that the faces are identical.

Use of the above-mentioned methods, which make some contribution to the problem of identification with the use of photographs implies the performance of methodologically complicated and laborious work, and it does not always, by far, provide the necessary answers. Moreover, in the case of negative result of identification, because of the lack of a reliable system of making a quantitative record of anthropological and anatomic features of photographs of the skull and face, it is impossible to use the characteristics of the skull that was examined to continue the search for a missing person.

In such cases, investigative agencies resort to identification of a corpse by reconstructing the face from the skull (plastic reconstruction). Without dwelling on the specifics of plastic reconstruction of a face from the skull, let us mention that this is a lengthy process that requires special skills, and it is not without an element of subjectivity.

For this reason, we undertook the task of developing an objective method of singling out, recording and evaluating facial features when making an identification from a skull and photographs taken prior to death. This task was the basis for theoretical development of the basic principles of designing an automated system that should permit, in a number of cases, primary selection of photograph material, bypassing the laborious and complicated stage of facial reconstruction from the skull. Development and creation of such a system are the logical continuation of the research of Yu. M. Kubitskiy, Z. I. Kirsanov, M. M. Pyatkevich, R. E. El'bur and other authors, who demonstrated the existence of a stable correlation between specific relations between dimensions of parts of the face and skull of the same individual.

We consider identification of a corpse on the basis of the skull and a photograph taken before death as a problem involving the choice between two hypotheses H_0 --the skull in question is that of the individual portrayed on the photograph (pairs with the same name); H_1 --the skull is not that of the individual in the photograph (pairs with different names).

We selected full-face photographs of the face and skull as identifying objects, on which we recorded the topographic anatomical points that are rather clearly depicted on the photographs of the face (skull) and which express the established correlations between structure of soft tissues and underlying bone and cartilage foundation (lateral and medial canthi of the eyes, mouth, nose, etc.). Quantitative tags characterizing the mutual position of these reference points must be used for identification. We selected the relative projections of different parts of the face (x) and skull (y) as such tags (Figure 1).

The relative height of the nose is:

$$\begin{aligned} y(6-12):y(6-9) \\ y(6-12):y(6-14) \end{aligned}$$

where y is the distance between the points indicated along the Y axis; the relative height of the middle of the face is $y(6-9):y(6-14)$; the relative height of the chin is $y(9-14):y(6-14)$; the relative width of the mouth is $x(8-10):x(-4)$, where x is the distance between points along the X axis; the relative distance between pupils is:

$$\begin{aligned} &x(5-7):x(1-4) \\ &x(5-7):x(6-14); \end{aligned}$$

the relative distance between the lateral canthi is $x(1-4):x(11-13)$; the relative distance between medial canthi is $x(2-3):x(1-4)$; there is a complex relationship between the cluster of lines (V. Yurans, 1967) crossing point 12 and points 1, 5, 7, 4.

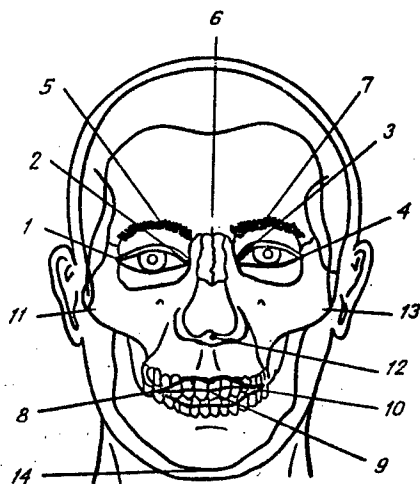


Figure 1.

Topographic anatomical points used to select quantitative indices

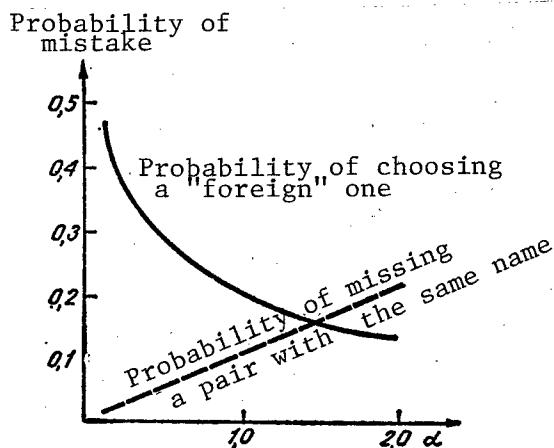


Figure 2.

Effect of coefficient α on probability of error

As we see from the above characteristics, the relative projections are grouped essentially in vertical and horizontal directions. By means of experiments performed on a computer, we selected the tags that were the most stable with changes in aspect (inclinations and turns of the head) out of the maximum possible number of tags.

Thus, each object to be identified (photograph of a missing person, photograph of the skull in question) can be described by ordered set of quantitative tags: $\vec{X} = (x_1, x_2, \dots, x_n)$. If we use $\vec{Z} = (z_1, z_2, \dots, z_n)$ to describe the result of comparing the photograph of the face to that of the skull and $f(\vec{Z}/H)$ to refer to the probability that the result of the comparison has the value of \vec{Z} in the case of hypothesis H , the solution rule used will have the following appearance:

if $\frac{f(\vec{Z}/H_0)}{f(\vec{Z}/H_1)} \geq \alpha$, hypothesis H_0 is chosen (pairs with the same name;
 if $\frac{f(\vec{Z}/H_0)}{f(\vec{Z}/H_1)} < \alpha$, hypothesis H_1 is chosen (pairs with different names),

where α is a certain threshold which depends on errors that are made.

Mistakes can be made in selecting a hypothesis, due to variations in thickness of soft tissues, distortions in processing the photographs and flaws in plotting the topographic anatomical points.

The first type of mistake involves rejection of hypothesis H_0 even though it is actually true. The second type of mistake involves the use of hypothesis H_0 when H_1 applies. In practice, it is impossible to reduce to a desired minimal level the probability of mistakes of the first and second type simultaneously. For example, a reduction of mistakes of the first type diminishes the sensitivity of the solution rule with regard to mistakes of the second type, i.e., it increases the number of photographs selected for subsequent work, and vice versa. The solution of this problem consists of making a rational compromise.

To date, experiments have been performed using the YeS 1022 computer to formulate and test the quality of the above-described solution rule, within the framework of the present study. Thus, using 41 pairs with the same name and 100 photographs taken of other individuals when they were living, determination was made of the numerical parameters of the solution rule and a graph was plotted of first and second types of mistakes as function of threshold α (Figure 2).

The obtained results can be interpreted as follows: For example, with $\alpha = 0.7$, the probability of missing a pair with the same name is 0.11 (in the "test," 2 out of 41 pairs) and the volume of material subject to further checking is reduced by 4 times.

Thus, it can be maintained that the use of this set of programs to identify a photographic portrait according to the set of available tags made it possible to reduce by 3-5 times the volume of the subarray subject to further checking. If, however, we consider that sex, age and other stable external features, special marks and individual distinctions can be used when comparing photographs, it is to be hoped that the size of the subarray subject to a final check could be reduced by dozens of times when comparing photographs. The experiments demonstrate the potential of the proposed approach to automation of the process of primary selection of portrait [photograph] material for identification.

We consider refinement of the method of comparing photographs taken in various aspects to be the main direction of future research on computer identification of photographic portraits. In addition, the incidence and evaluation of informative value of different elements of the face should be defined and used when making comparisons.

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POSSIBILITY OF DEFINING A CLOSE FIRING RANGE ACCORDING TO THE SIZE OF
POWDER AND LEAD DEPOSITS USING THE METHOD OF STATISTICAL ANALYSIS

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pp 26-28

[Article by I. Ya. Kupov, P. M. Zharikov, I. V. Belova and A. Kh. Yenikeyeva,
Chair of Forensic Medicine (headed by I. Ya. Kupov, doctor of medical
sciences), Ryazan' Medical Institute]

[Text] The possibility of defining the distance from which a shot was
fired at close range is not only of theoretical, but practical forensic
medical and criminological interest. N. S. Bokarius (1925), V. F. Chervakov
(1937), L. M. Eydlin (1939, 1963), B. I. Vakhliis and B. R. Kirichinskiy
(1951), V. I. Molchanov (1958) and others have reported that, with increase
in firing range, there is also an increase in area covered by burnt powder
[soot]. However, such a correlation has been rejected by I. V. Skopin
(1954) after firing from a TT pistol and by L. I. Gliko (1968), after
firing from a Kalashnikov submachine gun (AK) and Makarov pistol (MP). A. F.
Gliko (1974) observed consistent changes in diameter of the central powder
spot with increase or decrease in firing range with the use of smoke
powder shooting from a hunting gun.

We decided to test the existence of the above correlation in experimental
firing of a TOZ-12 sports rifle and Margolin sports pistol (MPM) at various
close ranges.

The targets were hit at a right angle from the above models of weapons,
at distances ranging from "point-blank" at 1-cm intervals until there were
no more soot deposits. Ten shots were fired at each range. The weapon
was not fixed in a rest during firing, but the shots were fired using a
support. In all, shots were fired into 590 targets.

We measured the area of deposits directly around the entrance hole (central
ring, spot). Casts of soot in the form of bands, arches, etc., beyond the
central zone of deposits were not taken into consideration. On each target,
we measured two perpendicular dimensions and their arithmetic mean was
evaluated as the diameter of the soot deposit. We then determined the
radius, square of radius and total area of soot deposits. The initial data
obtained were submitted to statistical processing. It was found that the

area of soot deposits increases when firing at distances ranging from point-blank to 32 cm ($P < 0.001-0.05$). Starting at 33 cm, the deposit area diminishes; it is no longer in the shape of geometric figures and its intensity also diminishes.

Statistical processing of data obtained after firing from the MPM revealed that the area of soot deposits in the form of geometric figures increases only when firing at ranges of point-blank to 9 cm ($P < 0.001-0.01$). There was no such pattern after firing at distances over 10 cm.

In the case of gunshot damage in a dark fabric, it is quite difficult to demonstrate the soot, and virtually impossible to determine the area and outline of the deposits. For this reason, we made color prints of metals* in the region of soot deposits on all of the targets and made the same measurements and calculations. The results obtained for the TOZ-12 rifle indicate that there is a gradual increase in area of metal deposits as the range increases, from point-blank to 24 cm. This is distinctly manifested at 5 cm intervals ($P < 0.001-0.01$).

The results of analysis of the color prints taken from targets with the use of the MPM indicate that the area of lead deposits increases as the distance increases, from point-blank to 7 cm ($P < 0.001-0.01$).

Upon comparing the size of the areas of soot deposits on white targets made of cotton material and lead deposits on the color prints [or impressions] obtained from these targets, we found that there were substantial differences. In all instances, the area of lead deposits was larger than the area of powder [soot] deposits, and not infrequently there was more than a 100% difference.

The results of these investigations lead us to the following conclusions:

1. With increase in firing range using a TOZ-12 sports rifle and Margolin sports pistol (MPM), the area of soot deposits, as well as lead deposits on color prints, increases.
2. This pattern is demonstrable for both models of weapons but to different degrees. When the type of weapon is known (TOZ-12, MPM), it can be used to define close firing ranges (on targets at ranges of 32 and 9 cm, respectively, and on color prints at ranges of 24 and 7 cm).
3. In this firing range, the distance can be defined under experimental conditions for the TOZ-12 rifle according to soot deposits on targets at distances of up to 1-2 cm, and according to lead deposits up to 5 cm. For the MPM, the range can be defined up to 1 cm according to size of soot and lead deposits.

*We used the color print method as modified by I. Ya. Kupov, SUD.-MED.EKSPERT. [Forensic Medical Expertise], Vol 11, No 4, 1968, pp 17-21.

4. After firing from both types of weapons, the visually demonstrable areas of powder deposits are considerably smaller than the corresponding areas of lead deposits on the color prints.

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DISTINCTIVE MORPHOLOGICAL SIGNS OF INTRAVITAL AND POSTMORTEM HIGH-ALTITUDE DECOMPRESSION

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pp 39-42

[Article by I. M. Alpatov, N. A. Gaydamakin and I. N. Chernyakov (Moscow)]

[Text] Decompression is one of the potentially hazardous factors in a number of occupations (pilots, cosmonauts, submarine crews and divers). The mechanism of development of pathological states referable to this factor is rather well-known and amounts to barotrauma to air-containing organs and cavities, formation of gas bubbles in blood and tissues; in the case of high-altitude decompression and lowering of pressure to 47 mm Hg or less, there is additional bubbling [boiling] of blood, lymph and intertissular fluid with formation of vapor bubbles in the organism.

The pathomorphology of decompression disorders, i.e., macroscopic findings and microscopic changes on the light optical level, has been described in many works (Busby, 1968, 1968a, 1968b; Powell et al., 1974; Rubissow and Mackay, 1974, and others). At the same time, there has been no coverage in the literature of such an important issue to forensic medical practice as differential diagnostics of intravital and postmortem high-altitude decompression. Nor are there any data dealing with the study of signs of decompression using an electron microscope.

Our objective included demonstration of signs of postmortem and intravital altitude decompression using a light and electron microscope.

The studies were conducted on puberal mongrel dogs weighing 4 to 7 kg. For 8 min, 3 dogs were exposed to a rarefied atmosphere corresponding to an altitude of 28,000 m (12 mm Hg pressure). The "climb" in the pressure chamber was at the rate of 100 m/s. The animals were examined 18 h after death.

Three dogs were sacrificed using ether vapor and their carcasses were exposed to the same decompression after 5 h under the same conditions. The carcasses of the other 3 dogs were submitted to decompression 18 h after they were sacrificed. We took specimens for examination immediately after

decompression from the dogs in the 2d and 3d groups. The carcasses of 3 more dogs sacrificed with ether were not exposed to decompression, and tissue specimens were taken from them 5 and 18 h after death. We examined the brain, lungs and liver. Pieces of organs were fixed in Carnoy fluid, imbedded in paraffin and the sections were stained with hematoxylin-eosin, methyl green-pyronine and toluidine blue according to Nissl. The material was treated by the method of N. A. Gaydamakin et al. (1974) for electron microscopy.

All of the dogs presented an increase in body and limb volume due to boiling of subcutaneous fatty tissue fluids during exposure to a rarefied atmosphere. Animals submitted to decompression before death and 5 h after being sacrificed revealed subcutaneous emphysema (crepitation demonstrable by palpation). The emphysema was more marked in the cervical and axillary regions. In the case of decompression 18 h after death there was no subcutaneous emphysema.

Macroscopic examination revealed gas bubbles in the vascular network of all internal organs in dogs exposed to decompression before death and examined 18 h later: intestine, pericardium, myocardium, meninges, muscle tissue, veins near the roots and arteries of the lungs. There were gas bubbles in vessels of all sizes, down to the smallest ones visible to the eye. Gas bubbles were also found in the cavities of the heart.

Histological examination revealed that, in all organs, the erythrocytes were assembled into columns and compact accumulations varying in size, the space between them being filled with eosinophilic substance. Electronograms revealed spherical cavities deep in the thrombi, filled with dust-like granules of electron-dense material. In the thrombi, the erythrocytes were adherent to one another; the surfaces directed toward the lumen of these cavities were deformed along a spherical curve (Figure 1). The spherical cavities were demonstrable in vessels of all calibers, including capillaries. In the liver, traces of gas bubbles were found not only in the lumen of the vessels, but in cells: large cavities deforming the outline of the nuclei were demonstrable in the hepatocytes (Figure 2).

In dogs, the carcasses of which were submitted to decompression 5 h after death, gas bubbles were demonstrable in visceral vessels. As in the preceding group of animals, they were visible in both large and small blood vessels. Histological and electron microscopic examination confirmed the presence of traces of gas bubbles in the capillaries. "Gas" spaces were also found in the hepatocytes. In the capillaries, the surface of these spaces were not of a regular spherical form, as observed in dogs exposed to decompression prior to death. Some of the gaseous cavities had the appearance of tortuous tracts, and the walls did not have a solid erythrocyte lining (Figure 3). In the lungs, many alveoli and fine bronchi were dilated, ruptured and filled with foamy fluid or blood. The vessels of the lungs were markedly plethoric, in some areas their walls were stratified and saturated with blood. In the liver, the trabeculae (lamina) were thinned down, there was dilatation and plethora of intertrabecular capillaries, with destruction and saturation with blood of the walls of blood vessels.

The nuclei of hepatic cells were hyperchromic; the cytoplasm of many hepatocytes presented severely widened cisternae in the cytoplasmic network, which are traces of formation of gas spaces. In the brain, there were signs of mechanical injury to the vessels, with autolysis of neurons and homogenization of contents of the nuclei and perikaryon. The gas bubbles in the vessels of the brain were of the same kind as in the liver.



Figure 1.

Dog liver 18 h after altitude decompression. Erythrocytic thrombus in capillary lumen, with spherical cavity (trace of gas bubble), formed by deformed erythrocytes and filled with dust-like granules of electron-dense material. Magnification 13,000×



Figure 2.

Dog liver 18 h after altitude decompression. Traces of gas bubbles can be seen in the cytoplasm of a hepatocyte. One of the spaces has deformed the outline of the nucleus. Magnification 8500×

Dissection of dogs in the third group, the carcasses of which were exposed to decompression 18 h after they were sacrificed failed to demonstrate gas

bubbles in the small visceral vessels; in medium and large caliber vessels, there were fewer gas spaces than in the vessels of dogs of the two preceding groups. We failed to demonstrate air in the cavities of the heart of the dogs that weighed less (4 kg). Microscopic examination revealed more severe tissular lesions in the lungs than in the preceding group. Extensive areas of lung tissue were taken up by dilated and injured alveoli filled with foamy fluid and blood; the preserved interalveolar septa were markedly hyperemic. Not infrequently, the fine bronchi were destroyed; many large vessels were injured and their walls were saturated with blood. In the liver, we observed breaks in many trabeculae; the intertrabecular capillaries were markedly dilated; erythrocytes were demonstrable in the lumen of lymph and bile capillaries; the walls of the blood vessels were injured and saturated with blood. The hepatocytes were shriveled, homogenized and hyperchromic. The gas spaces did not have a solid erythrocyte lining; there was incomplete adhesion of erythrocytes in the thrombi with fissures between them (Figure 4). In the brain, along with autolytic change in neurons and neuroglial cells, marked hyperchromatosis and homogenization of their nuclei and perikaryon, there were ruptures of blood vessels and saturation of their walls with blood. Areas of so-called perivascular edema, i.e., clear, honeycomb spaces, were demonstrable around many vessels. Electron microscopy failed to demonstrate traces of gas spaces in the capillary lumen.

These studies indicate that the gas bubbles that are formed in visceral vessels under the influence of decompression are very varied in size. They can be seen both upon macroscopic examination of carcass organs and microscopic and electron microscopic examination of tissues, i.e., their size could be commensurate with the diameter of an erythrocyte.

Gas bubbles appear not only in the vascular lumen, but intracellularly, in hepatocytes; intracellular formation of gas bubbles was not demonstrated in other organs. Evidently, the formation of gas bubbles in hepatocytes is related to the fact that these cells are in closer contact with the vascular lumen than the cells of other organs, and they are separated from the capillaries by a fenestrated endothelial lining, through which atmospheric pressure could be equalized. The cells of other organs, however, as we know, are separated from the capillary lumen by a dense endothelial lining, which also has an external sheath in the form of a basement membrane.

The signs of intravital altitude decompression are well-preserved in the carcasses for 18 h after death due to this factor. Under these conditions, the main signs of decompression are macroscopically visible gas bubbles in visceral blood vessels of large, medium and small caliber. Electron microscopy of the gas bubbles shows them to be in the form of regular spherical cavities formed by adherent erythrocytes.

Postmortem exposure to altitude decompression elicits less marked symptoms. With exposure 18 h after death, there are fewer gas bubbles in the lumen of blood vessels of large and medium caliber; no gas bubbles are demonstrable macroscopically in small visceral vessels. There is slower development of

subcutaneous emphysema. Evidently, the following causes are involved in the change in conditions under which signs of decompression develop in carcasses: Due to development of rigor mortis, loss of tissular turgor and force of gravity in the 18 h of the period after death, it is more difficult to equalize pressure between the atmosphere and lungs, between the lungs and vascular network of internal organs. Moreover, there is deterioration of agglutination capacity of erythrocytes. This is apparent from the fact that the erythrocytes involved in formation of the walls of the gas bubbles are not completely adherent to one another; fissures appear between the erythrocytes; the gas spaces in the capillary lumen become elongated and acquire the appearance of canals without a solid lining of erythrocytes.

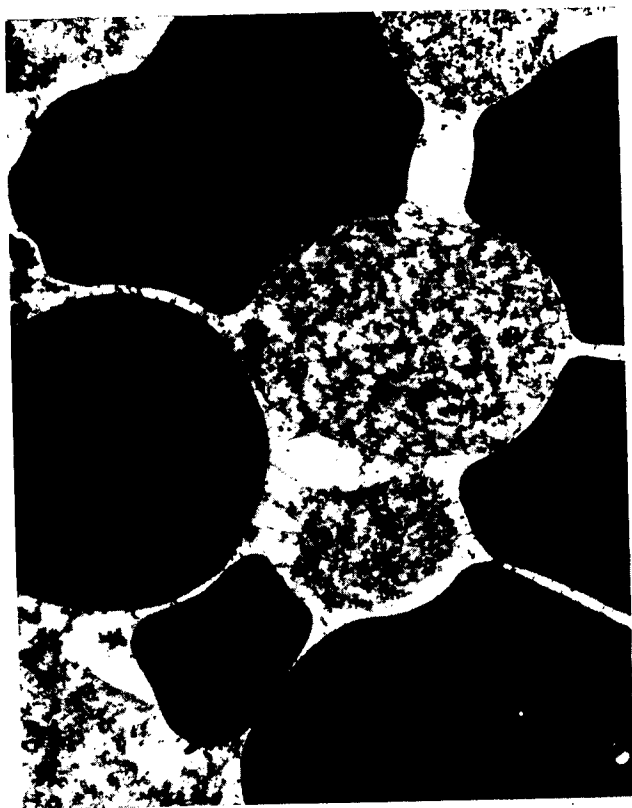


Figure 3.

Liver of dog whose carcass was exposed to altitude decompression 5 h after it was sacrificed. "Trace" of gas bubble deep in erythrocytic thrombus is irregular in shape; spaces are visible between erythrocytes involved in formation of the "gas" space. Magnification 9000×

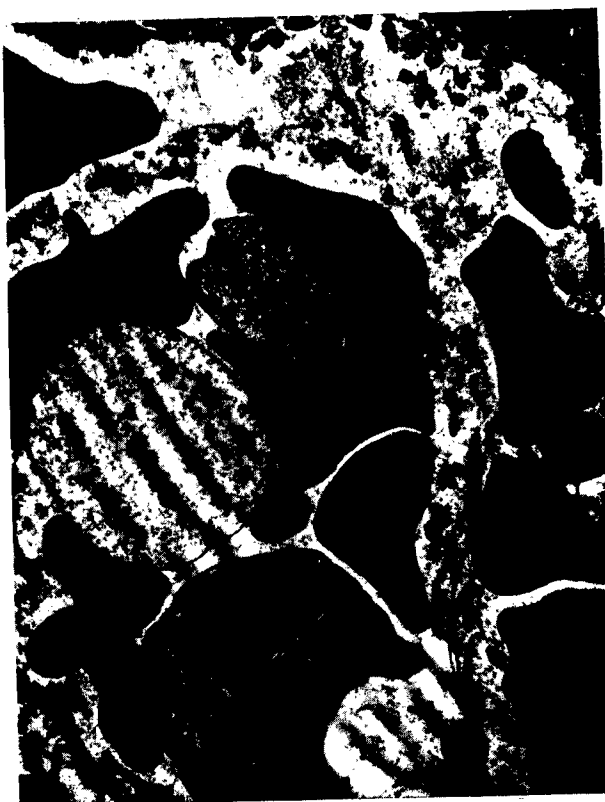


Figure 4.

Liver of dog whose carcass was exposed to altitude decompression 18 h after it was sacrificed. The "gas" space does not have a solid lining of erythrocytes; fissures are visible between the erythrocytes. Magnification 9500×

For this reason, some of the thrombi that develop around the gas bubbles after recompression may disintegrate. Boiling of body fluids at high altitude could be classified as one of the factors involved in formation of gas bubbles (Ye. A. Kovalenko and I. N. Chernyakov, 1972). Since there is less intensive boiling when there is an 18-h interval between the death of the animal and decompression (palpation after recompression failed to demonstrate subcutaneous emphysema), it is apparently difficult for gas bubbles to form through this mechanism.

The combination of autolytic changes and gas bubbles in the vascular lumen should be considered one of the important signs of postmortem decompression. Signs of autolysis include condensation of chromatin in the form of a rim around the nuclei, pyknosis and hyperchromatosis of the latter and homogenization of cellular cytoplasm in various organs. There is weakening of the mechanical strength of autolytically altered tissues. For this reason, the next significant signs of postmortem decompression, which was more marked with a long interval between death and decompression, should be considered the ruptures of vessels in the liver, brain and lungs, saturation of vascular walls with blood, injury to the walls of fine bronchi, dilatation and rupture of alveoli and impairment of hepatic trabeculae.

Thus, the signs of postmortem decompression are: a) decrease in or absence of subcutaneous emphysema; b) appearance of elongated gas bubbles in the lumen of blood capillaries, instead of the spherical bubbles inherent in decompression before death; c) presence of fissures between erythrocytes forming thrombi and gas spaces; d) the combination of autolytic changes in tissues and mechanical injury to blood vessels of various organs and parenchyma of the lungs.

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A DEVICE FOR PHOTOGRAPHIC SUPERPOSITION OF SKULL AND FACE PICTURES

Moscow SUDEBNO-MEDITSINSKAYA EKSPERTIZA in Russian Vol 20, No 4, 1977
pp 53-54

[Article by O. V. Filipchuk, Office of Main Forensic Medical Expertise
(headed by Prof Yu. P. Shupik), Ukrainian Ministry of Health, Kiev]

[Text] Making an identification by the method of superposition of photographs of the skull and face taken before death is a difficult and multi-stage process that takes up a considerable amount of time for the expert and laboratory technician.

For the sake of convenience and to shorten the time required for such examinations, we have constructed an optical device that makes it possible to view simultaneously and to photograph two pictures, that of the skull and face on a photograph. The optical system of this device is illustrated in Figure 1.

A light-beam-splitting glass plate (1) is coated with a semi-opaque mirror layer, as a result of which both the image of the object seen through the mirror, the photograph (Φ) and the image of the object reflected by the mirror layer, i.e., the skull (Ψ) fall on the light-refracting prism (2). A focusing biconvex lens (3) is installed between the photograph and light-beam-splitting plate to compensate for the difference in ray diagram. The images of the photograph and the skull are refracted by the prism (2) and fall into the examiner's field of vision.

Figure 2 is an overall picture of the instrument. Its optical part is assembled in housing (1). A mirror reproduction of a photograph, 6x9 cm in size, with reference points and outlines marked by the usual method, is put on the stage (2). There are two OI-19 lights (5) for the photograph, and the brightness thereof is controlled by rheostat (9). There is a head holder (3) and chin-holding device (4) that can be regulated vertically for the sake of convenience in using this instrument.

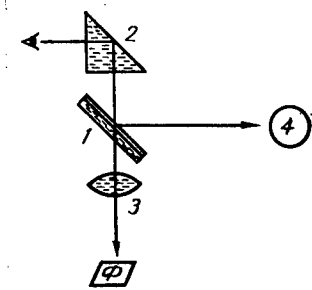


Figure 1.
Optical diagram of the instrument

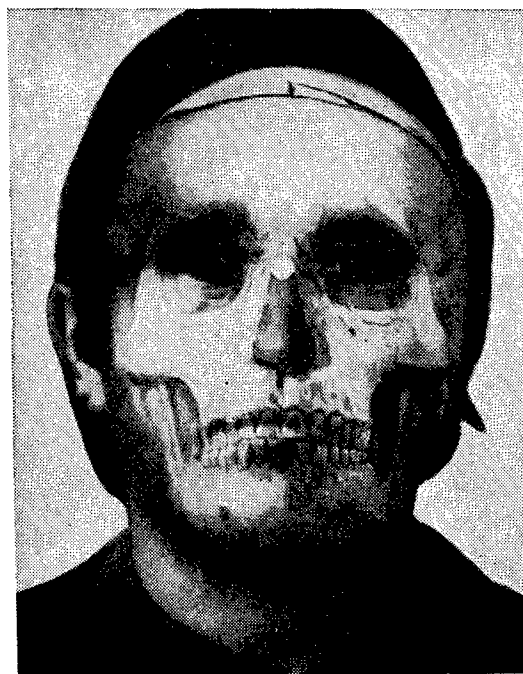


Figure 3.
Photograph of superimposed pictures
of face and skull

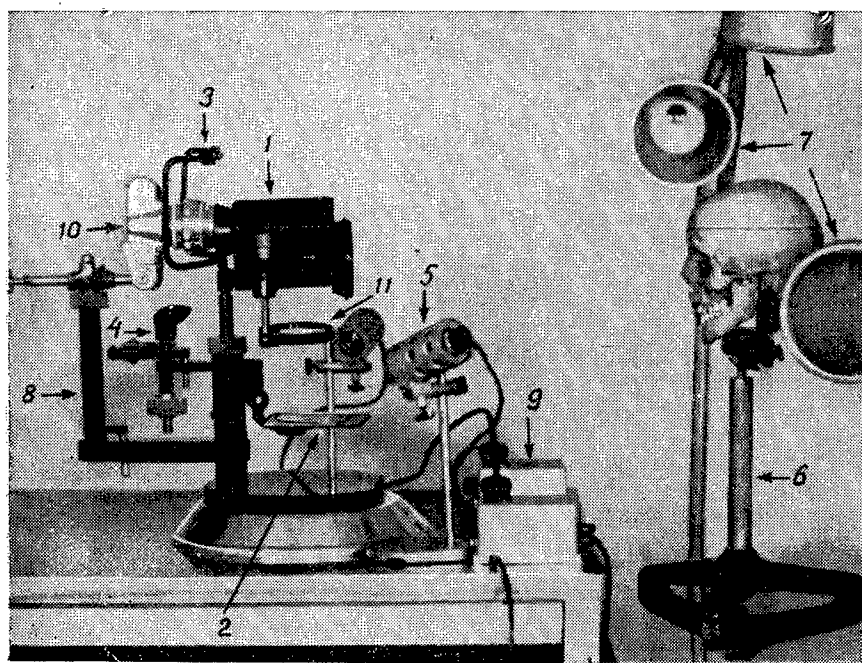


Figure 2.
Overall view of photographic superposition device

The skull to be examined is secured in holder (6) that has a sliding top so that its position can be altered in three planes. The usual lighting is provided for the skull from three points by means of stomatological lamps (7).

Operation of Device: The first stage is a visual inspection. Viewing the picture of the skull and photograph of the face concurrently in the field of vision, coincidence is obtained by altering the distance between the skull and the instrument. Thereafter, the size of the objects is adjusted more precisely by altering the height of the stage with the photograph.*

The skull is set in the required aspect by moving it with the head of the holder and, since the skull is 60-70 cm away from the examiner, there is no need for the assistance of a laboratory technician. Superposition of the images of the face on the photograph and skull according to size and aspect completes the visual stage of examination.

The second is the photography stage: a mirror camera (10) is brought up to the "window" of the instrument on a movable rod (8). The optical parameters were designed for use of the most popular inexpensive camera, of the Zenit type with a Yupiter-9 tele-objective, to lower the cost of the device. Sharpness is set according to the image of the skull on the dull glass of the camera, then the lens (11) is used to focus the photograph of the face. The optimum correlation between contrast of the objects to be photographed is selected by changing the brightness of lighting of the photograph using the rheostats (9). Thus, a photograph is taken of already superimposed images of the skull and face on the photograph, which rules out the need for separate preparation, matching and superposition of negatives of the two objects.

The results of photographic superposition using the device in question are illustrated in Figure 3. Expert practice confirmed the advantages of this instrument over the usual method of photosuperposition, both from the standpoint of convenience and shorter examination time.

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*We are in complete agreement with V. I. Shikanov (1973), who believes it is necessary to first determine the dimensions of the pictures according to some reference points on the photograph of the face to be identified, but this is not always feasible.

FORENSIC MEDICINE

DISTINCTIVE FEATURES OF ENTRANCE HOLE REGION AFTER FIRING FROM AN AKS-74 5.45 MM CALIBER SUBMACHINE GUN AT RANGES OF UP TO 30 CM

Moscow SUDEBNO-MEDITSINSKAYA EKSPERTIZA in Russian Vol 20, No 4, 1977,
pp 24-26

[Article by Yu. P. Sysoyev, Chair of Forensic Medicine (headed by I. Ya. Kupov, doctor of medical sciences), Ryazan' Medical Institute imeni I. P. Pavlov and the Medical Corps (Yu. P. Sysoyev, chief)]

[Text] The AKS-74 submachine gun is equipped with a compensator, which is elongated along the sides, in the front part of the "window" [opening]. The front face of the compensator is perpendicular to its length, and there is a circular extension on the face, around the "window," through which the bullet passes. The cartridge for the AKS-74 is equipped with a bullet with a steel slug.

Our objective was to determine the extent and distinctions of deposition of powder ["soot" is used throughout this article] deposits in the region of the entrance hole after firing from an AKS-74 at point blank and distances of up to 30 cm.

Method

Experimental shots were fired at a right angle to the target, which was made of new, white, unlaundered white material. The targets were attached to plywood backing sheets using thumb tacks at the corners. The barrel of the gun was wiped before firing, but not cleaned after each shot. The submachine gun was immobilized in a special firing rest which prevented horizontal movement but did allow minor vertical displacement. A total of 29 point-blank shots were fired into the targets and 10 into cadaver skin flaps. In addition, shots were fired into the targets at ranges of 1 to 30 cm (at 1 cm intervals, 12 targets), as well as at distances of 0.1 to 0.6 cm (0.1 cm intervals). In all, shots were fired into 310 targets and 10 skin flaps.

The targets and flaps were examined visually and under an MBS-1 stereomicroscope. Special attention was paid to powder deposits.

Results

After the point-blank shots, the entrance hole was square or in the shape of an 0.4×0.4 – 0.4×0.45 cm rectangle. There was some unraveling along the edges of the targets, and the threads were turned mostly outward, while a few were turned inward. We failed to observe any cross- or T-shaped holes in the material. In only one target there was a vertical tear away from the entrance hole, with 0.2 and 0.4 cm tear lines. We observed black areas of powder deposits along the edges of the entrance hole and around it, over an area of 3.0 – 3.1×3.2 – 3.4 cm, which faded toward the periphery, presenting a rather distinct outer margin.

On all of the targets, there were "tongues" of soot going down 1–2.5 cm from the above area, constituting its continuation, with rounded bottom edges. After firing special shots point-blank, without immobilizing the gun, these "tongues" were very long, 8 and even 10 cm. They can be attributed to the downward tilt of the front of the gun barrel at the moment of firing due to oscillation in the gun rest. The fact that the face of the compensator was not absolutely flush with the target, when a firm backing was used, was also involved in appearance of these "tongues" of soot. They also appeared when shots were fired at 0.1–0.6 cm, but their accentuation diminishes as the distance increased. No such "tongues" were seen when shots were fired at a distance of 1 cm.

Another distinction of the entrance hole region after firing point-blank from an AKS-74 is the presence of several circular prints [impressions] slightly above the entrance hole; they are 0.1–0.15 cm wide with a 1.5 cm outer diameter, and they are usually more distinct along the upper margin. These prints, which are situated in the area of the "tongues" of powder, are obscured to some extent by the latter. Their appearance is related to close compression (impact) of part of the target by the protruding ring of the compensator face when the shot is fired.

Such prints are not found when shots are fired at a range of 0.1 cm or more, so that they can be considered evidence of a point-blank shot.

After point-blank firing, we consistently found two more zones on the targets of soot deposits ranging from black to grayish in color toward the periphery; they began on either side of the entrance hole and circular powder-burn region around it. They are in the shape of two tilted "cones" with protruding outer sides and base, directed toward the entrance hole. The two cones are distinctly separated from one another and from the central powder-burn area. The overall appearance of the powder deposits after point-blank shots is illustrated in Figure 1.

Cone-shaped power deposits (as a result of passage of powder through the "window" of the compensator) are also observed after firing at 1 and 2 cm distances (Figure 2); however, as the firing range increases they grow in area, but their intensity diminishes. At ranges of 3 and 4 cm, we only observed small grayish spots [residue] without clearcut margins, and they were inconsistent; none was observed at ranges of 5 cm or more.



Figure 1.
Powder burns ["soot deposits"]
after firing at point-blank
range.



Figure 2.
Powder burns after firing at a
distance of 1 cm from compensator
face

As for the circular powder burn area around the entrance hole, when firing from a distance of 1 cm it was round and appeared to be divided into two parts: a black central part and adjacent dark gray peripheral part.

With further increase in firing range, the accentuation of the peripheral ring diminished and its external margins gradually disappeared. At the same time, we observed some increase in size of the total powder-burn area up to a range of 6 cm. Thereafter, the outer margins of the peripheral circle faded even more, becoming barely detectable, while the overall powder-burn area gradually decreased, with sharp fading of the deposits with increase in firing range.

Starting at 6 cm, the peripheral ring is no longer solid and has the appearance of arch-shaped casts with light spaces between them. There are similar spaces between the arch-shaped spots in the peripheral region to the darker central one.

With further increase in firing range, the light spaces widen, the outer margin of the central ring becomes less distinct and the peripheral one, faintly visible. The entrance hole region has the same appearance at distances of 10-14 cm, as well as 15-19 cm; however, the intensity of the soot deposits in the central region diminishes more and more and it becomes grayish in color. When firing at 20 cm or more, only a grayish central region was observed and there was no peripheral zone. At a distance of 25 cm, small, barely visible casts of grayish powder around the entrance hole were observed on some targets, but not on others. No soot deposits were demonstrated in any of the tests where targets were fired upon at ranges in excess of 25 cm. We failed to demonstrate manifestations of the thermal effect of powder gases and deposition of flecks of powder at all firing ranges.

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GENETICS

RECENT ADVANCES IN GENETIC ENGINEERING DISCUSSED

Kiev PRAVDA UKRAINY in Russian 21 Oct 77 p 4

/Article by V. Kordyum, doctor of biological sciences, head of a division of the Institute of Molecular Biology and Genetics of the Ukrainian SSR Academy of Sciences: "Genetic Engineering Designs"

/Text/ The development of any science is characterized by the appearance of new sections and trends. In this respect biology is not an exception. In the last few decades radiology, cryobiology, molecular biology, biophysics, bionics, quantum biochemistry and many other fields could be mentioned. It would seem that genetic engineering, which was one of the last to appear, should not produce a special sensation in our century abundant with news. Nevertheless, throughout the history of biology there was no such rapid development of a new trend, such transfer of forces and funds into it and such results in so short a time as occurred with genetic engineering. There is a reason for this.

Genetic engineering is a section of biology studying the natural and artificial transfer of any (existing in general and given specifically) hereditary information into all organisms. Heredity ensures the reproduction of the hereditary material and the realization of the genetic information contained in it, which is manifested in certain features. Thus the continuity of organisms is preserved.

A special polymer--desoxyribonucleic acid (DNA)--is the material bearer of heredity, that is, the substance in which genetic information is recorded. The material bearer of heredity and the method of recording the appropriate information in it is universal for all living things. In daily life man uses a 32-letter alphabet to record his communications. The machine language has only a 2-letter code. Heredity is recorded in the form of a 4-letter code: a sequence of four bases forming part of DNA--adenine, thymine, cytosine and guanine. On the basis of this information special cellular systems ensure the synthesis of all their components, sequence of processes and characteristics of their occurrence.

A programmed control machine is a graphic (although incredibly simplified) example of such an activity. The details output by it depend on the input of information; for example, the arrangement of holes on a punchcard. In the same way, in its fundamental principle--hereditary information--the bulldog differs from the canary only in the number of DNA and in the sequence of its bases in every cell. Such a basis for heredity theoretically allows its transfer from one organism to any other. Until recently it was quite unclear how to do this in practice. Now we not only know that such a transfer is possible, but we have all the necessary arsenal of reagents, instruments and methods making it possible to make any genetic manipulations planned and calculated in advance.

The transfer of a new heredity to organisms is by no means a new task. Let us take ordinary and remote hybridization. The varieties of cultivated plants and domestic animals, which form the basis for modern agriculture, were obtained by these methods. The possibilities of classic hybridization are by no means exhausted. Nevertheless, it is limited to a very narrow fundamental framework--the evolutionary closeness of partners. The mixing of heredity existing until recently was limited to intergeneric crossings. The new variety of the grain crop Triticale, which embodies the best qualities of wheat and rye, was obtained in this way. However, with genetic engineering "genetic heresy"--transfer and mixing of hereditary information without limit--has entered science and is beginning to enter practice. Here are several examples not theoretical from the supposed future, but from work already executed during past years: hybrids of the cells of man and carrot, chicken and yeast, man and mosquito and many others, just as unusual. They are hybrids of cells, from which--I would like to especially stress--whole organisms (chicken yeast?) as yet cannot be obtained owing to a number of principled, not technical, limitations. Nevertheless, they exist on a cellular level, although several years ago such things were not even written in science fiction works.

Hybrids (if the word "hybrids" is at all appropriate here) even more serious in their possibilities and consequences have been obtained. Certain portions of the heredity of higher organisms (for example, of the frog) were transferred to a bacterium. Such an inconceivable chimera exists normally. Of course, it does not have a leg and does not croak. However, what was taken from the frog is transmitted in the form of hereditary information from one generation of bacterial cells to another. Here there are no principled limitations on the realization of this (someone else's) information in specifically manifested features. Of course, neither the bacterium, nor people who received such material need characteristics of the frog. However, a child, before becoming an architect and designing majestic buildings, learns architecture on blocks, or builds with the help of a designer. Genetic engineering also learns the unprecedented in this way, using its "designer" for this. It does well to first learn this, because without the necessary skill and knowledge it is possible (already possible!) to create a consequence that cannot even be conceived.

Today we are able to introduce into the heredity of one organism not only information from any other organism, but also chemically synthesized hereditary material, including material that does not at all exist in living nature. This is only the beginning, the very, very beginning.

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GENETICS

CONTRIBUTIONS OF GENETICS TO VARIOUS FIELDS OF KNOWLEDGE NOTED

Vil'nyus SOVETSKAYA LITVA in Russian 12 Nov 77 p 4

Article by N. Dubinin, director of the Institute of General Genetics of the USSR Academy of Sciences, academician: "In the Name of Man"

Text Days of science of Moscow's Cheremushkinskiy Rayon devoted to the 60th anniversary of the Great October were held in Vil'nyus during this anniversary year. Many famous scientists from Moscow visited Lithuania. At the editors' request academician N. P. Dubinin, director of the Institute of General Genetics of the USSR Academy of Sciences, head of the delegation, prepared an article on the development and achievements of such a field of science as genetics for this newspaper.

We offer this article to the readers' attention.

Genetics, which studies phenomena of heredity and variability, is the central science of all the present teaching of life. Major practical problems are connected with the use of this science.

During the years of Soviet rule, owing to party and government concern and the establishment of an experimental base, scientist geneticists made considerable advances. For example, remarkable achievements were attained in selection. This is indicated by the work on wheat, sunflowers, barley, sugar beets and corn done by Soviet scientists. New promising forms of a new grain plant--Triticale--and a new method of potato selection were developed. The new breeds of domestic animals include the Tadzhik sheep breed and so forth.

It is no secret that an abundance of products and raw materials largely depends on the achievements of genetics in agriculture and in the biological industry and the solution of other major practical problems is connected with the use of this science. On the whole, in our days selections faces tasks surpassing everything that was done during 20,000 years of cultivated

farming and livestock breeding. On the average, it is necessary to increase the productivity of 1 hectare of arable land, meadows, pastures, fruit and berry crops and forests three or four times. In order to solve these problems with regard to all agricultural crops, pasture grass and forest crops our scientists are now successfully engaged in projects in genetics and selection on a regional and state scale on the basis of projects for the countries of the socialist camp.

All this work is done on a firm basis. In this case I have in mind the fact that state allocations for the needs of science increase every year, much attention is given to the training of scientific personnel and concern for the development of science is raised to a law. The 25th CPSU Congress noted that it is necessary to ensure the further development of the theory and methods of genetics for the development of new valuable varieties of plants, breeds of animals and cultures of microorganisms, as well as techniques of obtaining physiologically active substances for medicine, agriculture and a number of industrial sectors. "The practical introduction of new scientific ideas," said L. I. Brezhnev, "is now no less important a task than their development."

The set of studies in the field of genetics and selection for an increase in the volume and improvement of the quality of food and raw materials is of great importance for the solution of fundamental social problems. Genetic selection is economically the cheapest method of intensification of agriculture and the microbiological industry. On the basis of the advantages of socialism, genetic plant selection, creating forms possessing high qualities, productivity and resistance to diseases, eliminates from agriculture the need facing it for vast power and vast expenditures on the chemical industry and chemical protection agents. All this ensures an abundance of cheap products and raw materials and ensures a happy life for the Soviet man.

Recently, mankind has ever more perceptibly experienced the consequences of the scientific and technical revolution. Along with the beneficial aspect of this phenomenon it has a negative aspect connected with environmental pollution. Many chemical and physical agents enter the biosphere. They penetrate into man's cells and affect DNA molecules, where genetic information is recorded. These changes are called mutations and the agents producing mutations are called mutagens. People's sound health and the hereditary health of their offspring depend on the existence of a normal heredity. In case of damage to it defective children are born, cancer tumors appear and so forth.

The 25th Party Congress pointed out that among social problems there is no more important a task than concern for the health of the Soviet people. Our scientists, placing a barrier on the path of danger, developed two approaches to following the effect of environmental mutagens on heredity. The threats on the part of environmental mutagens detected by them are great achievements of genetics.

Substantiation of the teaching of man as a biosocial being is a major achievement of Soviet genetics. The development of personality is a dynamic process, in which social conditions play the leading role. Conversely, bourgeois scientists declare that the creation of the new man is possible only if his genetic program is changed. Previously, the attainment of this goal was conceived by means of the selection of higher races, while in our days it is conceived by means of genetic engineering. In fact, however, the new man--active builder of communism--is formed in the practice of socialist construction. Substantiation by Soviet scientists of the unity of the social and biological in man opens up new ways in the investigation and solution of the problems of pedagogy, psychology and jurisprudence.

Among the achievements of modern genetics in the last few years advances in genetic engineering have attracted special attention. Whereas previously the control of heredity during the development of animal breeds and plant varieties was attained by means of crossing, use of mutations and selection, genetic engineering "transferred" this problem to the level of sub-cellular and molecular structures. It is possible to obtain so-called DNA recombinant molecules and to introduce them into a selected cell. Individual genes of some bacteria have already been transferred to others. The genes of higher forms--frogs, sea urchins, silkworms, pomace flies, chickens and plants--were introduced into bacteria.

The problem of the transfer of nitrogen fixation genes from the air to the cells of higher plants is studied experimentally. The solution of this problem will change the principles of agrochemistry. Varieties resistant to diseases can be obtained in the same way, which will block the introduction of toxic chemicals into the biosphere. The transfer of some human genes into cells of bacteria is exceptionally promising. In this case insulin, hormones, antibodies, vitamins and so forth can be synthesized on an industrial scale. Many hereditary diseases can be cured by transplanting normal genes to sick people.

It is necessary to note the most important role of genetics for the development of the modern scientific Marxist-Leninist world outlook of nature and society. Owing to the achievements of genetics modern philosophical materialism has received proofs of the material nature of all the basic life phenomena.

Thus, on the whole, in 1977, the year of the 60th anniversary of the Great October Socialist Revolution, Soviet genetics is at the beginning of a tremendous coil on the spiral of its development.

N. I. Vavilov became the head of Soviet genetics 50 years ago. Linking genetics with social problems and with the philosophy of dialectical materialism was the most important activity of that remarkable man. In our days genetics becomes a vast material force and has advanced to the first

rank of modern natural sciences. Under the conditions presented by the advantages of socialism new horizons, possibilities of utilizing the achievements of genetics, open up to science and practice. There is no doubt that the next decades of the development of Soviet science will be marked by tremendous advances in genetics, which is called upon to ensure an abundance of food resources, man's health and longevity, creation of an appropriate environment for man and his harmonious development. All this will contribute to the realization of the great ideals of communism.

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CARCINOGENIC SUBSTANCES IN THE ENVIRONMENT AND PREVENTION OF MALIGNANT TUMORS

Leningrad VOPROSY ONKOLOGII in Russian Vol 23, No 10, 1977 pp 11-20

/Article by L. M. Shabad, Division for the Study of Carcinogenic Agents (L. M. Shabad, academician of the USSR Academy of Medical Sciences, head) of the Oncological Scientific Center (N. N. Blokhon, academician of the USSR Academy of Sciences, director) of the Academy of Medical Sciences, Moscow/

/Text/ From the very beginning the concept of carcinogenic substances has been connected with the environment and with its effect on man. Observations of occupational cancer known for more than 200 years indicate this (Pott, 1775). They served as the starting point for experiments showing the possibility of contracting skin cancer as a result of smearing the skin with coal tar (Yamagiwa and Ichikawa, 1916). In our country the first experiments on the induction of tumors by resins were begun in the early 1920's by N. N. Petrov and N. A. Krotkina, on the one hand, and by G. V. Shor and S. M. Damberg, on the other. Subsequently, a number of systematic investigations in this direction were conducted by G. V. Shor, N. G. Soboleva, L. M. Shabad, L. F. Larionov, G. A. Zedgenidze et al. During those years the results of experimental investigations were compared with observations of human pathology and the interest in occupational tumors did not fade, but increased, which is confirmed, for example, by the surveys by N. N. Petrov, L. M. Shabad and A. A. Epshteyn.

The establishment of the fact that, first, a number of chemical products can indeed produce malignant tumors both in animals and in man, second, these are environmental agents, to the effect of which man can be subjected for a long time in the process of production activity and, third, a malignant tumor does not appear right away, but only as the last link in a long chain of changes preceding it, was the main conclusion. This gave rise to the idea of precancer, which served as the basis for clinical cancer prevention. The elimination and cure of precancerous changes or states prevents the development of a malignant tumor. This conclusion, along with the detection of early, comparatively easily curable stages of cancer during preventive mass examinations of the population initiated by N. N. Petrov, undoubtedly, saved millions of lives.

The further development of experimental investigations led to the detection of the acting carcinogenic principles of various resins and soots. They proved to be polycyclic aromatic hydrocarbons, including benzpyrene (Kenna-way, Cook, Hieger et al., 1930-1933). It was also clarified that along with polycyclic aromatic hydrocarbons some aminoazo compounds also possess a tumor causing property (Sasaki and Yoshida, 1935; Kinoshita, 1937). In 1938 Hueper et al. induced cancer of the urinary bladder in dogs with 2-naphthylamine--a substance which even before that was considered the cause of occupational cancer of the urinary bladder in workers of the aniline dye industry. The possibility of finding chemical carcinogens in the bodies of elderly people and especially in those who died of malignant tumors was established in 1937 (L. M. Shabad, 1937). This was confirmed by a number of investigators (G. E. Kleyenberg, S. A. Neyfakh and L. M. Shabad, 1941, 1945; Steiner, 1940; Hieger, 1941; Truhaut, 1944, et al.). Along with the idea of exogenous carcinogenic agents the concept of endogenous blastomogenic substances, which continue to develop in various directions, appeared (L. M. Shabad, 1969). Of special interest are the latest observations by M. O. Raushenbakh et al. (1974, 1977), which revealed blastomogenic derivatives of tryptophan and tyrosine in patients suffering from leucosis and showed the possibility of correcting the metabolism.

In brief, during the decade of 1930-1940 the concept of chemical carcinogens was filled with a specific content. It turned out that different substances, which can be found both in the environment and in the human body, are such carcinogens. A study of different chemical carcinogens enabled us as early as 1938 to advance the thought of "experimental oncology at the service of cancer prevention." The experimental data obtained by that time on the varying carcinogenic strength of various resins, including shale resins of the USSR (L. F. Larionov, N. G. Soboleva and L. M. Shabad, 1934), some semifinished products of the aniline dye industry (G. E. Kleyenberg, 1938, 1939), aminoazo compounds (L. S. Morozenskaya, 1938, 1939) and so forth, made it possible to make certain recommendations to prevent a carcinogenic hazard. The report by L. A. Zil'ber, V. A. Ryazanov, A. N. Sysin and L. M. Shabad "The Tasks of Hygiene in the Field of Study of the Cancer Problem" at the 13th All-Union Congress of Hygienists in 1956 was a significant landmark on this path. This joint address by hygienists and experimental oncologists stressed the need for studying chemical carcinogens in the environment and the development of preventive measures. The new--hygienic--trend in oncology thus gained recognition.

Occupational tumors were the first and most studied objects of hygienic oncology or oncological hygiene. As is well known, the skin, respiratory tracts and urinary bladder, that is, organs which are either sites of entry or pathways of removal of chemical carcinogens, are their basic localizations.

Occupational skin cancer caused by fuel distillation products is now rarely encountered. An especially difficult situation with regard to the length of the contact with carcinogenic resins and the lack of hygienic conditions was

created at one of the petroleum distillation enterprises during the Great Patriotic War. As a result, after several years papillomas and even squamous cell carcinoma appeared in a number of workers, especially in individuals engaged in the cleaning of pipes through which carcinogenic resins passed. The measures taken eliminated this unique outbreak of "cancer of pipe cleaners" (Ye. M. Kravchenko).

Occupational skin cancer was described in workers at petroleum refining enterprises. For example, according to A. F. Shaposhnikova et al. (1974) 512 such patients were detected in the city of Grozno, 53.2 percent of whom had (mainly at the old plant) a long contact with various petroleum products. This shows the need for sanitary and hygienic measures at the enterprises of sectors where a carcinogenic hazard can arise and for the introduction of techniques that would eliminate it. The fact that neither skin cancer nor precancer were detected in workers at modern, well-equipped petroleum distillation enterprises under a systematic hygienic control, despite their very long length of service, attests to achievements in this area (M. M. Gimadeyev).

Occupational malignant tumors of the respiratory tracts were described in workers engaged in the extraction and processing of nickel--in the lungs (S. V. Znamenskiy) and in the nasal tracts (A. A. Tatarskaya). The frequency of lung and stomach cancer, the former being considered an occupational disease, increased in workers who had a prolonged contact with asbestos (F. M. Kogan). At modern enterprises for the extraction and processing of asbestos a number of processes were hermetized and the contact with the carcinogenic hazard was reduced (F. M. Kogan et al.).

Of special interest are the investigations by V. G. Konstantinov et al. pertaining to aluminum electrolysis shops. Some plants use self-calcining anodes in this process (the anode mass includes coal tar pitch), which contributes to a high concentration of the carcinogenic hydrocarbon benzpyrene in the air of work premises, while other plants use precalcined anodes, which does not lead to the release of benzpyrene. Systematic observations made during 11 years showed an increased frequency of lung cancer in the first case and an absence of this phenomenon in the second. Thus, occupational pathological, physicochemical and hygienic observations unquestionably showed the dependence of contracting cancer on the presence of certain carcinogenic substances and on the possibility of prevention.

In particular, a great deal was done in the USSR for the prevention of occupational cancer of the urinary bladder. A number of carcinogenic substances were completely removed from production: 2-naphthylamine, 3,3-dichlorobenzidine, 3,3-dioxybenzidine, orthotolidine, orthoaminoazotoluol, paraaminoazobenzene and so forth. A new technique of obtaining industrial 1-naphthylamine has now been developed, in which the presence of carcinogenic 2-naphthylamine in it is reduced from 5 to 0.05 percent, that is, 100 times (I. L. Lipkin and L. M. Shabad, 1972).

The new method of synthesizing amino-Tobias acid developed in the USSR can serve as a striking example of the importance of changing techniques for the prevention of a carcinogenic hazard. This substance, which is an important semiproduct in the aniline dye industry, was previously prepared by the amination of 2-naphtol. The well-known strong carcinogen 2-naphthylamine appeared in this process and subsequently, by sulfonation, amino-Tobias acid was obtained from it. Although amino-Tobias acid does not have carcinogenic properties, the very process of obtaining it was very dangerous. At present, however, the production of amino-Tobias acid begins not from the amination, but sulfonation, of 2-naphtol, owing to which not carcinogenic 2-naphthylamine, but noncarcinogenic oxy-Tobias acid, subsequently transformed into amino-Tobias acid by amination, is the semiproduct.

With regard to benzidine production extensive work on its hermetic sealing was done in the USSR (I. L. Lipkin). Although tumors of the urinary bladder are still found in workers in this production, the number of cases has declined. New investigations (V. A. Genin) showed the combined effect of benzidine and the intermediary product during its synthesis--hydrazobenzene. Experimental investigations disclosed an increased carcinogenic hazard with such a combined effect (L. M. Shabad and V. A. Genin) and this involved the implementation of a set of sanitary measures in benzidine production. In general, the production of this carcinogenic substance has been reduced in connection with its diminished use in the production of azo dyes.

A special medical supervision of workers at aniline dye production facilities, which includes systematic histological investigations, is conducted in the USSR. According to I. S. Temkin (1962), malignant tumors of the urinary bladder in individuals subjected to cystoscopy developed 10 times less frequently than in those who rejected it. This was the consequence of the fact that pretumor changes subjected to an efficient treatment were detected during cystoscopy. Thus, not only the efficiency of a hygienic, but also of a clinical, prevention of cancer of the urinary bladder is demonstrated.

A systematic preliminary study of the possible carcinogenicity of new (or insufficiently studied) products of the chemical industry both in experiments on animals and by means of various express methods plays an important role in the control of occupational cancer (L. M. Shabad, G. V. Pliss, L. N. Pylev et al.). In a number of cases the results of such investigations were utilized for the substantiation of the removal of certain carcinogens from production or for the adoption of appropriate safety measures.

Chemical carcinogens can be not only the cause of a comparatively small number of cases of occupational cancer, but also of a much greater number of cancer cases among much wider sections of the population. Asbestos dust is spread throughout the atmosphere of settlements near enterprises and carcinogenic products of the aniline dye industry or resins and pitches of by-product coke and petroleum refining plants enter into reservoirs and soil with sewage. However, the burning, or rather the incomplete burning of

various types of fuel, during which polycyclic aromatic hydrocarbons and perhaps even nitroso compounds are formed, is the basic reason for the pollution of the environment with carcinogenic substances.

The discharge of polycyclic aromatic hydrocarbons into the atmosphere by heating systems, industrial enterprises and transport is the basic source of environmental pollution with them. At present of especially great importance is automobile exhaust (Hunigen et al.) and, as first shown by us in 1969 (L. M. Shabad and G. A. Smirnov), aircraft exhaust.

Chemical carcinogens entering the atmosphere are partly destroyed by ultraviolet rays and ozone and partly settle on earth. In 1959 we reported (L. M. Shabad and P. P. Dikun) the detection of benzpyrene in the soil of a big city (Leningrad), which was subsequently confirmed with regard to soil samples in the United States, France, the FRG and the Czechoslovak SSR. Our systematic investigations showed that benzpyrene can penetrate into deep soil layers, including ground water, on the one hand, and can pass into plants, on the other. At the same time, some plants as, for example, grain crops or cotton, do not accumulate this substance, whereas such an accumulation occurs in other plants. Benzpyrene in potato tubers was also detected by other authors---in the FRG (Grimmer et al.), the GDR (Engst and Fritz) and the USSR (N. Ya. Yanisheva et al.).

The content of benzpyrene is subject to seasonal fluctuations. As a rule, it is smaller at the end of summer than at the end of winter. This depends on the destruction of benzpyrene by some soil microorganisms. Together with M. N. Meysel and his associates we succeeded in isolating cultures of soil bacteria (*Sphericus* and so forth), whose introduction into soil heavily polluted with benzpyrene sharply reduces its concentration. However, when benzpyrene is introduced into such cultures, its amount is reduced by 60 to 80 percent within 6 to 8 days.

For the control of wind erosion it was proposed that fields be treated with shale resins, so-called nerostins, in the amount of 1.5 to 2.5 tons per hectare. In the initial resin the content of benzpyrene was 80 micrograms per kg of the preparation. After several weeks up to 200 or 250 micrograms per kg of this substance were detected in the soil samples of treated fields, but during subsequent months its amount gradually decreased, totaling 5 to 6 micrograms per kg, that is, it went back to the level observed in the soil of untreated fields.

Many hundreds of soil samples from the most diverse areas of the USSR were studied in our laboratory and certain amounts of benzpyrene were found in all of them. In the samples taken in a rural area removed from industrial centers and motor roads the level of benzpyrene usually totaled up to 5 micrograms per kg. We consider this level the background depending on the general spread of polycyclic aromatic hydrocarbons throughout our planet. In addition to the results of human activity, the natural origin of polycyclic aromatic hydrocarbons, for example, as the result of its synthesis

by certain plants in the presence of a carbon containing substrate (L. M. Shabad, K. Vettig and A. Ya. Khesina, 1976), as well as volcanic activity (A. P. Il'nitskiy, G. A. Belitskiy and L. M. Shabad, 1976), can also take part in the creation of such a background. We would like to stress that natural origin can explain only a minimal part of the total amount of benzpyrene in man's environment.

A systematic investigation of chemical carcinogens, primarily polycyclic aromatic hydrocarbons, in reservoirs (L. M. Shabad, A. P. Il'nitskiy et al.) showed that a distinctive circulation of these substances also occurs there. They enter into reservoirs from atmospheric and soil pollution and with the sewage of industrial enterprises, the shower runoff of big cities, the exhaust of ship engines and so forth. The role of ship engines, which discard up to 500 micrograms of benzpyrene per hour, was especially clearly shown in our laboratory (V. G. Klubkov et al., 1972). In reservoirs chemical carcinogens can be accumulated in bottom deposits, as well as in fish, mollusks and other organisms. For example, the mussel can be considered a trap for benzpyrene (G. M. Gortalum).

Without further dwelling on the results of individual investigations, we will stress that the concept of circulation of chemical carcinogens in man's environment developed on their basis. According to its course the accumulation and destruction of carcinogens, deposition and degradation and formation of a certain background are possible and this in turn creates the basis for a hygienic limitation and for measures for purifying the environment or at least lowering the level of carcinogenic substances in it.

Here, however, a very serious question arises: Is it really possible to consider chemical carcinogens the causes of many malignant tumors in man?

We believe that at present there are sufficient facts for a positive answer to this question. For example, there is no doubt that a number of occupational tumors are caused by chemical substances. Cases involving usually rarely encountered neoplasms are especially significant in this respect. Angiosarcoma, or the malignant endothelioma of the liver, which in the last few years has been noted in workers, who had contact with vinylchloride for many years, many hundreds of times more often than could be expected, can serve as a striking example (see surveys by L. M. Shabad et al., 1975; 1976).

Some harmful habits are another example. Thus, betel chewing is widespread in India and Pakistan and "nas"--mixtures basically containing tobacco, lime and ash--was chewed in the Soviet Central Asian republics at one time. As a result, cancer of the oral cavity and tongue developed after many years. It is remarkable that neoplasms developed precisely at the place where the chew was placed. In the localities where from the force of habit it was put under the right cheek cancer developed on the right side and where it was put under the tongue, on the lower surface of the tongue. Therefore, the etiological significance of "nas" and betel is indisputable. The question of

the nature of chemical carcinogens acting in this process is still unclear. Our attempts to detect significant amounts of benzpyrene in "nas" were not crowned with success (A. Ya. Khesina). It can be assumed that in this case some nitroso compounds are formed from nornicotine under the effect of saliva ferments and bacteria of the oral cavity.

An extremely vast literature is devoted to the significance of cigarette smoking in the genesis of lung cancer. This type of cancer is found in smokers many times more often than in nonsmokers, the risk of contracting it directly depending on the number of smoked cigarettes. Benzpyrene--0.6 micrograms per 100 Russian cigarettes and 1.1 micrograms per 100 other cigarettes--was detected in tobacco smoke (P. P. Dikun and S. G. Chushkin). By means of an intratracheal administration of tobacco resins it was possible to experimentally induce lung cancer in rats, although in a small number of cases (Yu. P. Borisjuk). In brief, there is every reason to consider cigarette smoking, especially in large quantities, a significant cause of lung cancer. The increase in the incidence of this disease in the 20th century correlates with the spread of cigarette smoking begun during the second decade of this century. The increase in the incidence of cancer of the larynx and the urinary bladder is also connected with cigarette smoking, of cancer of the oral cavity and tongue, with cigar smoking and of cancer of the lower lip, with pipe smoking. Prevention of the formation of all these neoplasms is clear--it lies in completely giving up a harmful habit or at least in reducing the contact by decreasing smoking and by appropriate filters.

Cigarette smoking is not the only cause of lung cancer. The increase in its incidence is undoubtedly also connected with the pollution of the atmosphere from a number of sources which we enumerated above. This is indicated by the indisputable fact that lung cancer morbidity is higher in big cities than in small ones and, in general, is higher in cities than in rural areas. Lung cancer is found more frequently in industrialized centers, where the concentration of polycyclic aromatic hydrocarbons and, in particular, benzpyrene in the environment is high. The observations by V. G. Konstantinov and his associates (1974) of the increase in the incidence of lung cancer in workers at electrolysis shops, where self-calcining anodes are used, and by Selikoff and his associates (1975) of workers engaged in road pavement ("roofing workers") are a significant demonstration of the etiological role of benzpyrene found in the impurities of inhaled air. All the above-cited indicates that chemical carcinogens indeed play an important role in the formation of neoplasms in man. It should not be forgotten that in the light of present data on transplacental blastomogenesis (see, for example, L. M. Shabad, T. S. Kolesnichenko and Yu. D. Sorokina, 1975) chemical carcinogens can also cause tumors in future generations.

Measures aimed against chemical carcinogens acquire especially great importance. This includes, first, control of such harmful habits as smoking or "nas" chewing. Figures cited by some British authors (Doll, Fletcher and Horn) indicating that in individuals who quit smoking the risk of contracting cancer gradually diminishes are especially reassuring.

In a number of cases, as, for example, in electrolysis shops of aluminum plants, comparatively small changes in techniques are sufficient in order to avoid a carcinogenic hazard, while in other cases, as, for example, in the aniline dye industry, the innovations in techniques necessary for this are much more complex, but still possible (I. L. Lipkin and L. M. Shabad). In general, changes in the technology of production of a number of products can play a decisive role. Since most chemical carcinogens enter man's environment as a result of pyrogenetic processes, improved burning is of outstanding importance. The more completely fuel is burned, the greater the efficiency, the smaller the valuable waste and the fewer the discarded carcinogens. Waste-free technology based on a closed cycle, in which all the waste is used anew, is ideal. Progress in technology leads to progress in hygiene. A special section for the prevention of the formation and detoxication of carcinogenic substances has now been established within the Interdepartmental Scientific and Technical Council for Overall Problems of Protection of the Natural Environment and Rational Utilization of Natural Resources at the State Committee for Science and Technology of the USSR Council of Ministers.

A number of measures for protecting the environment against chemical carcinogens are also possible in the field of communal hygiene. This includes primarily a correct organization of heating systems in cities. Centralization of boiler rooms, replacement of hard fuel with liquid fuel and liquid fuel with gas and the most complete and efficient fuel burning possible are the first task. For example, its solution in Moscow led to the fact that it became the least polluted city among the world's capitals. An extensive reorganization of heating systems took place in London in the last 20 to 25 years, which led to the disappearance of smoke fog (smog). A tendency toward a reduction in the incidence of lung cancer is also beginning to show (Lawther, 1975). Significant measures to improve heating systems have also been taken in New York in the last few years (Nelson, 1975).

Efficient urban development also contributes to the purification of the atmosphere in cities. The ventilation of streets and squares depends on their sufficient width and a correct alternation of tall and lower buildings. Trestles for motor transport and pedestrian underpasses are extremely important, because they make it possible to lower the number of stops and starts of motor engines. Our investigations (L. M. Shabad, A. Ya. Khesina, S. S. Khitrovo and M. A. Zabezhinskiy) showed that, at the same time, an especially great amount of exhaust gas is released with benzpyrene, especially at intersections. In brief, all the measures aimed at reducing the discharge of carcinogenic substances into the atmosphere contribute to cancer prevention.

Important measures are taken to prevent the entry of carcinogens into food products. This includes control of food dyes, preservatives and other technological admixtures. Much attention was given to the processes of smoking fish and meat products, for example, sausages. A number of investigations

(L. M. Shabad, P. P. Dikun et al.) showed that they contain certain amounts of benzpyrene and other polycyclic aromatic hydrocarbons. The concentration of these substances depends on the method of smoking. Smoking liquids, whose use makes it possible to prepare products not containing carcinogens, have now been proposed.

Along with all the enumerated technological approaches to the problem interesting us there is another, purely hygienic, approach directly aimed at protecting man from harmful effects by the legislative way. This is the establishment of limits and maximum possible doses or concentrations for harmful substances in certain spheres of the environment. The problem of a hygienic limitation of carcinogenic substances has its own history. For many years it was believed to be impossible to determine the maximum possible doses and concentrations for carcinogens, owing to the lack of the threshold effect in them and, chiefly, owing to the damage done by them to the cell genome. Druckrey even proposed the concept of "genotoxicology" and believed that not a single dose of a carcinogen can pass without an effect. However, there has been a change in views in the last 10 years. Our article (L. M. Shabad, 1966) pointed out that, despite a number of difficulties, a hygienic limitation of carcinogens is possible and necessary. The dependence of a carcinogenic effect on a dose firmly established in experiments (L. A. Andrianov, L. N. Pylev, N. Ya. Yanysheva and many others) serves as the main basis. The need for introducing hygienic limits arose in connection with the impossibility of fully removing some carcinogens from man's environment. This pertains not only to such substances as alphetoxins or other carcinogenic plant products, but also to such substances as polycyclic aromatic hydrocarbons. The latter are now widespread throughout the planet and form a distinctive background, owing to industrial and especially (aviation) waste, on the one hand, and to the possibility of synthesizing them in living nature (plants and some bacteria) and volcanic activity, on the other. With regard to the lack of a threshold in the effect of chemical carcinogens, in this respect they do not differ from radiation, for which, despite the lack of a threshold, certain limits were established on the basis of international agreements.

All these considerations made it possible to develop in experiments (L. M. Shabad, L. N. Pylev, N. Ya. Yanysheva et al.) and propose the maximum permissible concentrations for the most widespread polycyclic aromatic hydrocarbons and benzpyrene. In 1972-1973 the USSR Ministry of Health approved the maximum permissible concentration for benzpyrene in the air of settlements in the amount of 0.1 microgram per 100 cubic meters and for the air of a work zone, 15 micrograms per 100 cubic meters. The second maximum permissible concentration is much higher than the first with due regard for the 6-hour work day, the limited number of years of work and so forth.

On the basis of the data obtained by A. P. Il'nitskiy and N. Ya. Yanysheva and subject to a discussion at special conferences in 1976 the USSR Ministry of Health approved the maximum permissible concentration for benzpyrene in the water of reservoirs at the level of 0.005 micrograms per

liter. At present data are being accumulated for the purpose of developing the maximum possible concentration for this carcinogen in soil. At the same time, it is necessary to take into consideration the patterns in the transfer of benzpyrene into plants, especially those used in food.

The introduction of the maximum permissible concentration for benzpyrene is a tool of control of and incentive for lowering the pollution of the environment with this substance. The maximum permissible concentration approved for benzpyrene cannot be considered an absolutely safe dose and the established level is temporary and depends on the knowledge accumulated by the present time.

The clarification and solution of problems of hygienic limitation and, in general, of the control of carcinogenic effects largely depend on the results of study of the mechanisms of carcinogenesis. At present it is clear that the substances that we call carcinogens, when entering the body, in some cases and under certain circumstances can be activated and transformed from procarcinogens into true, final carcinogens and in other cases can be detoxicated and destroyed. Final carcinogens are combined with the macromolecules that control the processes of cell multiplication and differentiation. In order that the changes caused in these processes by a carcinogen may lead to the formation of a tumor, they must be fixed and inherited by the next generations of transformed and then malignantly degenerated cells. It can be assumed that this occurs owing to its combination with DNA. Such an idea justifies the term of "genotoxicology." In our opinion, however, it does not follow from this that any carcinogenic dose will leave its trace in the cell genome. The possibility of releasing affected sections from DNA and a subsequent full restoration, so-called DNA reparation, have now been firmly established. As a rule, such a reparation ensures a normal development of organisms, despite the large number of mutagenous and carcinogenic effects (M. M. Vilenchik).

A number of modern express methods of determining the carcinogenicity of various chemical substances have been constructed on the relationship between mutagenesis and carcinogenesis. It should be kept in mind that, in principle, all of them are indirect and that observations of man's pathology or numerous experiments on various types of animals are necessary for a final opinion. As an example, we will point out the possibility of utilizing the drosophila fruit fly for determining the carcinogenicity of chemical substances (L. M. Shabad, G. A. Belitskiy, Ye. M. Khovanova, Ye. G. Logvinenko, 1976).

A further study of the mechanisms of carcinogenesis can make it possible to interfere in the most diverse intimate aspects of this process. Substances that can be inhibitors of blastomogenesis, for example, 7,8-benzoflavon, chloramfenikol and dextramycin, are now known (G. A. Belitskiy, T. A. Bogush and I. A. Konopleva). Thus, along with the clinical and hygienic prevention of tumors a biochemical prevention of carcinogenesis will perhaps occur in the future.

Thus, from isolated purely laboratory investigations we arrive at extensive state measures. A number of decrees by the Communist Party and the Soviet Government directed toward protecting man's environment and public health and toward preventing the most important diseases, including malignant tumors, attest to this. The words of I. P. Pavlov, the great Russian physiologist, to the effect that "having just gone through the experimental fire..., present medicine is transformed into medicine of the future, that is, into hygiene in the wide sense of the word" have an especially urgent ring as far as oncology is concerned.

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SEPTORIA OF WINTER WHEAT CROPS IN THE UKRAINE

Moscow ZASHCHITA RASTENIY in Russian No 9, 1977 p 17

[Article by S. N. Kovalenko, assistant in the department of phytopathology, USKhA - Ukrainian Agricultural Academy]

[Text] In the past, in many oblasts of the Ukraine (especially in the wooded and forest-steppe zones) septoriosiis was widespread among winter wheat crops. Data from route inspections (1972-1975) gives evidence that the disease is encountered in all regions of the forest-steppe zone. However, the intensity of its development depends on ecological and other factors.

One ought to note that the forest-steppe zone of the UkSSR is characterized by great diversity of climatic and soil conditions, which determine the spread and development of the disease. It has been established that septoria affects winter wheat crops less in the eastern parts (Poltavskaya Oblast, a sub-zone with insufficient moisture) and more in the western area (Ternopol'skaya Oblast--which has sufficient moisture). Thus, in 1974 in the kolkhoz "Truth" in the Ternopol'skaya Oblast, all crops were infected but the degree of disease development was 28 percent. In the kolkhoz "Zarya Kommunizma" in the Cherkasskaya Oblast, the degree of infection was 87 percent, the degree of development--29 percent. In the Mirgorod strain testing station (Poltavskaya Oblast) in 1972 and 1974, winter wheat crops were infected in 46 and 10 percent (degree of development 6 and 1 percent).

The correct diagnosis and knowledge of the biology of the pathogen takes on important significance (the length of the incubation period, the place of retained infection, the conditions of wintering). Long-term study of septoriosiis has not been given proper attention, therefore the drying of leaves due to the effect of the pathogens has often been taken as their normal physiological aging.

We established that in the forest-steppe of the Ukraine, septoriosiis among winter wheat crops appears in the course of all vegetation periods beginning with the formation of second and third leaves. It appears on the leaves, foliated sheaths, nodes and rarely on the stems. On the ear scales, the

disease is noted in isolated years (primarily in the Ternopol'skaya Oblast) and is not significant (the degree of disease does not exceed 13 percent).

In the winter, the first indications of septoria appear on the lower leaves in the guise of oval or irregular yellow forms which gradually grow into spots. Eventually, the center of the spot becomes ash-grey with very obvious dark brown spots--the pycnidium of the fungus and filar nyctisporae are formed in them. They spread by means of air currents and dripping rain and infect the leaves and other organs of plants. In a year with increased humidity, the collection of spots is quickly increased, they fuse and soon cover all the leaves of the lower tier, which die as early as the fall. The diseased plants (especially in the early periods of sowing) do not bear the winter as well and often die.

In spring, septoria is spread from the lower leaves to the upper, younger ones; it reaches maximum development in the milky ripeness phase of the grain.

Observations revealed that the spots of septoria on germinating and growing plants differ. On sprouts, they are ordinarily wide and oval, spreading along the entire width of the leaf-plate and are not limited to the veins. On growing plants, it is always oblong and limited to the veins. The formation of spots leads to a decrease of assimilative surface. On the ears of diseased plants, undersized wrinkled grains are formed, having lowered energy for sprouting and lower field germinating capacity, with decreased protein content. Shortage of winter wheat grain in the forest-steppe of the UkSSR [Ukrainian Soviet Socialist Republic] is 10-32 percent. Septorioses, pathogens *Septoria tritici* and *S. nodorum*, are preserved in the form of pycnidium and pycnosporae on the diseased plant residue. Infection by seeds does not play an essential role. Varieties immune to septoria have not appeared. Mironovskaya 808, Lyutetsens 505 and Akademicheskaya appear to have greater resistance. Aurora, Kavkaz, and Bezostaya 1 were shown to be the most susceptible. The Il'ichevka and Polesskaya 70 varieties occupied an intermediate place.

For the protection of winter wheat from septoria, the following measures are recommended: the destruction of the diseased plant residue remains by plowing under the stubble of the wheat with the next autumn field plowing; preventing the loss of grain with the aim of limiting the appearance of diseased sprouts; maintenance of established standard quantities of seeds per hectare, and cultivation of varieties with increased resistance.

Methods have important significance which hasten the maturing of plants, in particular spring harrowing of crops at a time when the lower leaves, infected with septoria as well as with rust, powdery mildew and other diseases are destroyed.

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PSYCHIATRY

ESTONIAN PSYCHIATRIST DISCUSSES SIXTH CONGRESS OF PSYCHIATRISTS

Tallin SOVETSKAYA ESTONIYA in Russian 1 Oct 77 p 2

/Interview with Prof Yu. Saarma by L. Bozhich: "Listen Also to the Other Side"/

/Text/ The Sixth Congress of the World Association of Psychiatrists was held in Honolulu (Hawaiian Islands) from 28 August through 3 September of this year. Prof Yu. Saarma, an Estonian scientist--corresponding member of the USSR Academy of Medical Sciences, member of the Presidium of the All-Union Society of Neuropathologists and Psychiatrists, honored physician of the Estonian SSR, chief psychiatrist of our republic, head of the Department of Psychiatry at Tartu State University, honorary member of the Belgian Royal Society of Psychiatrists, corresponding member of the Turkish Society of Psychopharmacology and author of more than 125 scientific works published in Soviet and international journals and collections--also took part in its work as member of the Soviet delegation.

The editors asked the professor to answer several questions.

/Question/ Yuriy Martynovich, as far as we know, you are not a novice in the World Association of Psychiatrists. You participated in its major forums, were elected to its key bodies and participated in international conferences of psychiatrists in Moscow, London, Geneva, Washington, Milan, Liege and other cities throughout the world...

/Answer/ Quite true. In 1966 I participated in the work of the Fourth Congress in Madrid, where, essentially, the International Association of Psychiatrists was formulated organizationally. At the Fifth Congress of the Association held in Mexico in 1971 I was elected president of the section for higher nervous activity. Finally, I participated in the present Sixth Congress in Honolulu, where again I was elected chairman of the section for higher nervous activity.

/Question/ Please share your impression of the last congress.

/Answer/ It was perhaps the largest both in the number of representatives and addresses. A total of 300 meetings (plenary sessions, sections, symposiums and so forth), at which more than 1,500 reports and papers on various problems of psychiatry were read, were held in a week. Of course, physically, we simply were unable to attend all the meetings. Therefore, we chose those that were of the greatest scientific interest to us.

It should be noted that significant results have been obtained in the field of psychiatry both in our country and abroad in the last few years. Therefore, the increased mutual interest manifested by specialists in the achievements of their colleagues from various countries was quite natural.

/Question/ However, as already noted in the Soviet press, the organizers of the congress lent it a pronounced political direction, which had nothing to do with science and the solution of the problems facing modern psychiatry.

/Answer/ Unfortunately, yes. The atmosphere in which the Sixth Congress of Psychiatrists was held sharply differed from all the previous congresses in the attempts by some people to discredit and defame Soviet psychiatry and the Soviet country as a whole. This ugly fuss concerned the notorious problem of "dissidents." I recall that attempts to place this problem on the agenda were also made at the Fifth Congress. At that time, however, the leaders of the World Association of Psychiatrists resolutely rejected them as groundless and scientists were able to calmly discuss their urgent problems.

However, during the years following Mexico anti-Soviet agitators did not sleep. Led from one center, they waged, using military terminology, a mass attack against Soviet psychiatry. This attack was waged in three basic directions: First, "work directed at the public," that is, a wide use of means of mass information--press, radio and television--where fables not confirmed by documents, claiming that, allegedly, in the Soviet Union healthy people were considered sick, were wrongfully held in psychiatric hospitals and so forth, were told with various embellishments to readers, listeners and viewers. Second, enlistment of all kinds of renegades, who renounced the Soviet homeland at one time, in these dirty purposes. The third direction--the same mass anti-Soviet treatment of progressive foreign specialists in psychiatry: intimidation, secret telephone calls, letters containing threats and so forth. I myself personally saw such letters during foreign meetings with colleagues from various countries. This campaign was nothing but an echo of the "cold war."

/Question/ Evidently, the fact that the organizational committee was led by slanderers and political intriguers was most deplorable.

/Answer/ I would say that it was not only led by them, but, obviously, showed indulgence toward them. When the delegates to the congress headed for the first plenary meeting, along the road some young people handed them leaflets with an anti-Soviet content. Similar slanderous leaflets and pamphlets were scattered on tables in halls and corridors. When our delegation expressed its protest, the representatives of the organizational committee stated that they were only responsible for order in meeting halls and auxiliary premises were not their concern.

However, the matter was not limited to this. On the third day the program simply mentioned a meeting and did not indicate the subjects of reports or the speakers themselves. Our delegation refused to attend this "meeting." We learned that from the very beginning, according to a plan worked out in advance, it was to be transformed into an unruly anti-Soviet show not having anything to do with science or with the tasks of this congress. For this purpose the not unknown Plyushch, Baykhanskaya and other questionable personalities and traitors of the homeland were brought there in advance at the expense of the American and British associations. Constantly appearing now in the lobby and now in the halls, they behaved in a brazen manner, interfered in the work of the congress, gave interviews incredible in their monstrous lies and spread all kinds of rumors. The unofficial meeting held under the guise of a so-called "free discussion" was the culmination of all the vain attempts by the anti-Soviet agitators who gathered in Honolulu.

One of our Czechoslovak colleagues was present at this "spectacle," which was produced by Weinberg, the U.S. representative, and Sidney Bloch, the not unknown anti-Soviet agitator, as well as the representatives of Australia and New Zealand. Later, discussing the atmosphere of hysteria and dullness that reigned at it, he exclaimed: "This is such a disgrace and for psychiatrists in particular!"

A press conference of the Soviet delegation--incidentally, the most crowded at the congress--was held on the second day. There, along with business-like, particularly professional, questions, which comprised the majority of the questions, we were also asked provocative questions aimed at compromising not only our physicians, but all Soviet medical science. The representatives of the "Freedom" radio station and some American journalists were especially zealous.

However, the indisputable advantage of the Soviet delegation in this duel was that truth was on our side. All our answers, statements and reports were proven in a demonstrative and strictly scientific manner and the participants in the press conference were given the opportunity to become acquainted on the spot with histories of diseases, epicrises and other documents, whereas not a single organizer of the badly smelling anti-Soviet campaign undertaken during the days of the congress could present a single reliable document, a single conclusion of experts in confirmation of his insinuations.

The report by Prof Eduard Armenakovich Babayan, the most famous Soviet psychiatrist, on the organization of psychiatric aid in the USSR and on the humaneness of Soviet legislative acts in the field of psychiatry was heard with great interest and attention at one of the plenary meetings of the congress. Incidentally, Professor Babayan, the intelligent, highly erudite and excellent specialist, despite all the intrigues of the anti-Soviet agitators, became one of the most popular people at the congress, in the best sense of this concept.

/Question/ How did the participants in the congress react to all this anti-Soviet fuss?

/Answer/ In different ways. However, it is remarkable that during the congress most of our foreign colleagues came up to us and advised us in a friendly way not to pay attention to these dirty "politicians," who violated even the most elementary and oldest legal requirement: "Listen also to the other side!"

There were also people, especially after our press conference, who confessed with embarrassment: "There is so much noise about your 'dissidents' all over that it is difficult not to believe. Now you have convinced us of the opposite."

My old acquaintance, Professor Harrer, vice-president of the Austrian Society of Neuropathologists and Psychiatrists, whom I saw in Moscow not long before my trip to Honolulu, said: "I visited many psychiatric hospitals in the Soviet Union and saw many useful and interesting things, which completely refutes the fabrications of your country's enemies." Incidentally, if I am not mistaken, the newspaper VOLKSTIMME is now publishing reports by the journalist who accompanied the Austrian delegation on the trip throughout the Soviet Union.

/Question/ What can you say in conclusion?

/Answer/ Despite all the devices of our country's enemies, the moral victory was ours and Soviet science will continue to develop successfully. Despite the unhealthy situation at the Sixth World Congress of Psychiatrists created by its organizers, the scientists who gathered in Honolulu succeeded in examining all the modern problems of psychiatry. The following were the most important: Organization of psychiatric aid to the population (in this matter the Soviet dispensary system is still only a dream for many countries); second, all the social aspects leading to mental diseases.

The congress made it possible to obtain an extensive survey of what now takes place in the field of psychiatry in the world.

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PSYCHOLOGY

B. F. LOMOV DISCUSSES THE WORK OF THE INSTITUTE OF PSYCHOLOGY

Moscow OBSHCHESTVENNYE NAUKI in Russian No 1, 1978 pp 166-174

[Interview with Prof B. Lomov by Correspondent V. Senatorov]

[Text] The Institute of Psychology was established under the administration of the USSR Academy of Sciences in 1971. Within the relatively short time of its existence it has transformed into the nation's leading center for work on the pressing problems of psychological science. V. Senatorov, our correspondent, asked Professor Boris Lomov, corresponding member of the USSR Academy of Sciences and director of the Institute of Psychology, to describe the work of this scientific collective.

Correspondent: The increasingly broader use of scientific psychological knowledge to solve the economic, social, and ideological problems of our developed socialist society is posing new tasks to scientists. What contribution is the collective of the USSR Academy of Sciences Institute of Psychology making to completion of these tasks? What is the main subject matter of its scientific research?

B. Lomov: At the very beginning, our institute was established as an integrated scientific research institution called upon to solve the fundamental problems of psychological science and develop the theoretical principles of its applied areas. The institute's work is structured in several main directions--theoretical psychology, experimental psychology, social psychology, engineering psychology, labor psychology, and the neurophysiological principles of mental activity.

Research in these areas is dictated by the requirements of life itself, chiefly by change in the nature of social labor and increasing movement of the center of gravity of labor into the mental sphere, by radical renovation of the equipment and organization of production in the conditions of the scientific-technical revolution, by growth in the complexity of human activity, and by a rise in the role of social consciousness, the social activity of people, and subjective factors in the life of the socialist society.

Utilization of the achievements of psychological science in social practice is becoming a most important condition for growth of labor productivity and quality and the effectiveness of production and control, development of modern equipment and production processes, improvement of socialist social relations and the socialist way of life, and development of the new man.

Development of applied psychology is closely associated with work on general theoretical problems. The institute's main objective in this area is to create a systems theory of psychology and define the dialectic laws governing development of psychological science itself.

As we know, modern psychology is a highly differentiated system of scientific disciplines and directions. Some of them already have age-old traditions, and their objects and methods of research are clearly defined (for example in child and pedagogical psychology). Others are in a formative stage (social psychology). Still others are just beginning to develop (for example forensic, organizational, and space psychology). All of these areas are at the boundaries of different sciences, and their development requires the most intimate cooperation of associated sciences. Determining the goals, objectives, objects, and problems of different areas of psychology, determining their theoretical grounds, analyzing them, and relating them to development of general psychological theory is a pressing task. This is why it is so important to work intensively on the general theory of psychology, which could insure careful selection and systematization of the scientific data, ideas, approaches, methods, and conceptions accumulating in each specialized area and, consequently, development of psychological knowledge as a whole.

The methodological principles of modern psychology, the functions of psychology in developed socialist society, and the ways for introducing its achievements into practice are integrated problems of analysis with which essentially the institute's entire collective is dealing.

Researchers in theoretical psychology are concentrating their attention on application of the principles of the systems approach in psychology, on making the structure of psychological knowledge more exact, on developing the conceptual machinery of psychological science, and on the specific ways the concepts of dialectical materialism could be applied to it. K. Platonov's monograph "Sistema psikhologii i teoriya otrazheniya" (The System of Psychology and Reflection Theory) (soon to be released) is interesting in this aspect. It presents, from the standpoint of Lenin's theory, ideas concerning the methodology of psychology, it systematizes the categories and concepts of psychology, and it analyzes the relationships between that which is conscious and that which is unconscious in the different levels of mental activity. The book also makes a broad theoretical and experimental analysis of the mechanisms behind regulation of mental activity, based on the principle of the unity of human activity, consciousness, and social relations.

Mental processes and functions are being studied experimentally in three directions--psychophysical factors, visual perception, and the psychology of creativity and thinking. Some new laws governing sensory-perceptual

systems have been established through experimental research. Research on the specific features of formation of mental processes in various types of activity has been completed. The results of this work have been generalized in the monographs "Psikhofiziologicheskiye issledovaniya individual'nykh razlichiy" (Psychophysiological Research on Individual Differences) (1976) by V. Nebylitsyn, "Psikhofiziologiya i psikhofizika" (Psychophysiology and Psychophysics) (1977) by Yu. Zabrodin and V. Lebedev, "Problema porogov chuvstvitel'nosti i psikhofizicheskoye metody" (The Problem of Sensitivity Thresholds and Psychophysical Methods) (1976) by K. Bardin, "Psikhologiya tvorchestva" (The Psychology of Creativity) (1976) by Ya. Ponomarev, and "Myshleniye i prognozirovaniye" (Thinking and Prediction) (in press) by A. Brushlinskiy.

In social psychology, much attention is being devoted to methodological problems and to seeking the most effective approaches for analyzing the psychosocial mechanisms of social regulation of human behavior. The research results are presented in the collective monographs "Psikhologicheskiye problemy sotsial'noy regulatsii povedeniya" (Psychological Problems of Social Regulation of Behavior) (1977) and "Metodologiya i metody sotsial'noy psikhologii" (The Methodology and Methods of Social Psychology) (1977), and in the monograph "Sotsial'naya psikhologiya lichnosti" (Social Psychology of the Personality) (in press) by Ye. Shorokhova.

Correspondent: The readers of our interdisciplinary journal are obviously especially interested in the "frontier" areas of psychology, solution of the problems of which requires development of cooperation among representatives of associated disciplines. Could you describe these problems?

B. Lomov: The institute's plans devote significant attention to research on the relationship between biological and social factors in human mental development, activity and individual consciousness, and the structure of the personality and its properties. These fundamental properties, which lie at the boundary between different areas of knowledge, require a systems approach in their examination.

Take as an example the relationship between social and biological factors in the human mind. This problem is doubtlessly the most important among the complex of problems pertaining to man. Marxist philosophers have clearly defined the approach that should be taken toward this problem, and it is a good theoretical foundation for our concrete research. Priority is being placed on research revealing the dialectics of the bridges connecting the social and biological levels of human behavior together.

Two collectively written anthologies are interesting in this aspect--"Biologicheskoye i sotsial'noye v razvitii cheloveka" (Biological and Social Factors in Human Development) (1977) and "Problemy geneticheskoy psikhofiziologii cheloveka" (Problems in Human Genetic Psychophysiology) (soon to be released). The article authors include not only psychologists but also philosophers, sociologists, lawyers, geneticists, and neurophysiologists.

Another group of problems acquiring pressing significance centers about the psychological aspects of activity. Once again, all of the institute's subdivisions are studying these problems.

Research on the social aspects of the Marxist category of activity has made it possible to reveal the relationship between consciousness, activity, and communication through the subject--the concrete personality. The principle of differentiating the subjects of activity and research on how activity is determined through the social status of the subject and his social life have made it possible to reveal the social and individual mechanisms behind regulation of human behavior. K. Abul'khanova-Slavskaya has prepared the monograph "Deyatel'nost' i psikhologiya lichnosti" (Activity and the Psychology of the Personality) for publication; it presents a theoretical analysis of the multilevel structure of activity and of the forms of its mental regulation (reflex, unconscious, conscious, motivated, controlling, and so on), as well as of the types of activity regulation employed by the personality (functional control, creative, and so on).

The institute is also conducting research on control and operator activity and on the psychological prerequisites for effective use of automated control systems. The psychophysiological mechanisms behind cognitive mental activity in the presence of various functional states and the psychophysiological principles of individual differences in intellectual activity are being studied experimentally.

By making labor more efficient on a psychologically grounded basis we are developing the creative capabilities of the individual and keeping his efficiency at a high level. These problems are being worked on by labor psychology and engineering psychology, the role and significance of which are growing immeasurably today.

Our institute is the coordinating center for research on these problems. Analysis of man-machine systems occupies a central place among them. We believe that in this system, man is the principal unit while the machine is simply that which arms man and frees him of routine and cumbersome operations, acting as a resource for satisfying the needs of the individual, including his creative needs.

On the other hand equipment control imposes certain requirements on the individual's memory, on concentration and distribution of his attention, on his ability to orient himself in space, and on human emotions. The significance of the problem of man's reception, processing, and storage of information necessary for equipment control is growing. The complex of man-machine problems includes research on the human mind, psychophysiology, functions, and properties. This research is being conducted by different laboratories of the institute with the participation of specialists from other scientific centers and industrial enterprises. Thus the institute has done work on psychological and psycholinguistic problems associated with man's work with different classes of symbols and symbol systems. The criteria for optimum symbol systems to be used in information displays in man-machine systems have been developed. These materials are presented

in the work "Psikhologicheskiye problemy pererabotki znakovoy informatsii" (Psychological Problems of Symbolic Information Processing) (1977). The book "Inzhenernaya psikhologiya: metodologiya, teoriya, praktika" (Engineering Psychology: Methodology, Theory, Practice) (1976) generalizes the results of development in engineering psychology and some of the prospects for its further development.

Management psychology or, as it is still called, organizational psychology is a new interdisciplinary problem with which practically the entire collective of the institute is involved. Because it evolved in the subsoil of labor psychology, engineering psychology, and social psychology, its problems have turned out to be associated to a certain extent with the research objectives and methods of these disciplines. This is precisely why the theoretical problems of management psychology, problems directly associated with completion of this discipline's development as an applied area of psychological science, have become so important today.

As we know, the management problem can be viewed in two aspects--solution of production problems and interpersonal communication. Basing themselves on observations made in production conditions, psychologists are making a clear classification of the forms of communication between executives and subordinates, they are revealing the concept of individual management style, they are examining the principles of automating various forms of managerial activity, and they are analyzing the possibilities for using computers to model psychosocial relationships within the collective.

The institute's colleagues have completed theoretical and experimental research on the style and effectiveness of management of production collectives, they have revealed the psychological content of management style, and they have proposed a model of its definition, one simultaneously combining different degrees of expression of directive and cooperative management and non-interference (connivance). A special method has been developed for assessing administrative style at the middle and bottom levels. A method has been proposed for assessing management effectiveness on the basis of the executive's concrete contribution to the results of the collective's activity. The premise that different management styles have a selective influence on different production, psychosocial, and integral criteria of management effectiveness has been shown to be true. It has been recommended that the conclusions of this work be included in the training of management personnel.

The results of research on the effect of management style on organization of socialist competitions have been written in the form of practical recommendations, which have been adapted by the Karacharovskiy Mechanical Plant in Moscow.

Correspondent: Thus practical introduction of the institute's recommendations might serve as a real confirmation of the fact that psychology is entering a qualitatively new stage in its development. Could you describe application of recommendations developed by psychologists in greater detail?

B. Lomov: The work of the social psychology sector, which is doing much of its research "in the field"--that is, right at the enterprises and institutions and in worker and student dormitories--is interesting from this point of view. The sector's colleagues are collecting extremely rich information through enquiries, questionnaires, and group and personal interviews. Generalizing this information, they are producing concrete recommendations on organizing management, on creating a favorable psychosocial climate, and on improving work with personnel, especially young workers.

Besides at the Karacharovskiy plant, our base plant, intense work is being done on the problems of socialist competition and psychosocial climate in the Kurganpribor Production Association (Kurgan, Western Siberia). Concrete psychosocial studies have been used as the basis for suggesting the criteria and defining certain characteristics of psychosocial climate and for revealing the role of moods, business relationships, and emotional potentials of the collective in formation of the psychosocial climate, and the significance of factors such as the ability to work together, the compatibility of members of a collective, and so on.

Theoretical work on methods for studying socialist competition and psychosocial climate is being concluded; the results will be published as the collectively written anthology "Sotsial'no-psikhologicheskii klimat i sotsialisticheskoye sorevnovaniye" (Psychosocial Climate and Socialist Competition). The collectively written monograph "Sotsialisticheskoye sorevnovaniye. Kollektiv. Lichnost'" (Socialist Competition. Collective. Personality) has been prepared for printing. It examines socialist competition through analysis of the structure and dynamics of the collective, group activity, and mutual relationships within the collective. A major section of the book is devoted to analysis of the role of socialist competition in formation of the personality of the young worker and the influence of socialist competition on labor productivity and inclusion of the worker in the production process.

Research has shown that in addition to economic, psychosocial, and educational significance, competition has a specific function in management organization. It is the means for encouraging the common membership of the collective to participate in management, a means for improving administration, and a means for improving control by social organizations. Competition is one of the factors and mechanisms of the collective's social development. Competition can complete this social task only if its organizational forms correspond to the collective's level of development.

After conducting psychosocial research on the motives of competition, on individual and collective activity in this movement, and on the best ways to organize competition at the Karacharovskiy plant, psychologists produced an entire complex of practical recommendations which were approved by the plant's management and later by the Production Enterprise Administration of the Moscow City Executive Committee, to which the plant is administratively subordinated. The recommendations are now being disseminated to the other

25 plants of this administration. Further work on this topic, to which the subtopic "Psychosocial Aspects of the Young Worker's Adaptation" has been added, is being done at a number of enterprises.

Correspondent: Coordination of research by various Soviet scientific centers occupies an important place in the activity of the USSR Academy of Sciences Institute of Psychology. Perhaps you could acquaint us with this aspect of the collective's work.

B. Lomov: Our institute functions as the head institute in scientific research pertaining to social, engineering, and labor psychology, and to the special applied problems of general psychology and psychophysiology. We are providing theoretical and methodological assistance to higher and secondary special educational institutions, schools, and the appropriate scientific institutions.

Recommendations on developing psychological research in the Tenth Five-Year Plan have been written in collaboration with the USSR Society of Psychologists and the country's leading scientific centers. The institute initiates joint research with a number of other institutions, and it sponsors conferences, symposiums, and meetings in which specialists from associated disciplines participate.

Each month the institute holds methodological seminars on the main problems of psychological science; scientists from all corners of the country and from other countries come together at these seminars. These seminars promote efficient coordination of the efforts of the leading specialists. The results of statement and discussion of new problems at these seminars are generalized and published.

The collection "Printsip razvitiya v psikhologii" (Principle of Development in Psychology) (soon to be released) is an example of such a collectively written publication. As we know, the problem of development is the most acute methodological and ideological problem of modern psychology. Psychologists of the GDR and the FRG took part in creating this collection. This is no accident, since the institute maintains broad international contacts.

Correspondent: Could you describe these ties?

B. Lomov: The USSR Academy of Sciences Institute of Psychology has established business ties with the leading psychological institutions of fraternal socialist countries. Our creative cooperation is developing in many channels: We are exchanging scientific information, experimental methods, and specialists, and we are conducting joint research and laboratory studies.

Each year the institute accepts about 25 specialists from the socialist countries for on-the-job training, dissertation work, familiarization with experimental methods, preparation and publication of joint articles, and so on.

We contribute to the international psychological journal *STUDIA PSYCHOLOGICA*, which was established in 1965 on the initiative of the Slovak Academy of Sciences and is presently being published in Bratislava,* and to the East German psychological journal *ZEITSCHRIFT FÜR PSYCHOLOGIE*, which has been in existence for such a long time.

The results of joint research have been reflected in a large number of collectively written works. They include the international monograph "Uspekhi psikhofiziki" (Successes of Psychophysics) (Berlin, 1977, in German) and the collection "Metodologicheskiye problemy psikhologii v yevropeyskikh sotsialisticheskikh stranakh" (Methodological Problems of Psychology in European Socialist Countries) (Bratislava, 1975, in Slovak).** We are preparing the monograph "Sotsial'no-psikhologicheskiy klimat na predpriyatiyakh" (Psychosocial Climate at Enterprises) jointly with Bulgarian psychologists.

In compliance with the Master Plan for Coordination of Scientific-Technical Research Conducted by CEMA Countries, the USSR Academy of Sciences Institute of Psychology is participating in work on the "Scientific Principles of Ergonomic Norms and Requirements" program, heading and coordinating work on the topic "Ergonomic Requirements on Technical Resources for Displaying Information to the Human Operator." Psychologists from Bulgaria (Sofia University and the Institute of Technical Cybernetics), the GDR (Humboldt University in Berlin and the Technical University in Dresden), Poland (Warsaw Institute of Technical Esthetics and the Central Institute of Labor Protection), and Czechoslovakia (Prague Institute of Psychology, Bratislava Institute of Experimental Psychology, and the Institute of Labor Protection) are participating in research planned for a 5-year period. These integrated studies have a common goal--heightening the effectiveness and quality of labor. The Soviet side is responsible for development of the theory and methodology of research in engineering psychology on information systems, and for practical experimental and design tests of these systems.

The materials of our collective research have been generalized in the works "Inzhenernaya psikhologiya i sintez sistem otobrazheniya informatsii" (Engineering Psychology and Synthesis of Information Display Systems) (1975) by V. Venda and "Osnovy postroyeniya apparatury otobrazheniya v avtomatizirovannykh sistemakh" (Construction Principles of Display Apparatus in Automated Systems) (1975) by I. Litvak, B. Lomov, and I. Soloveychik. The monograph "Psikhologicheskiye problemy vzaimnoy adaptatsii cheloveka i mashiny v sistemakh upravleniya" (Psychological Problems of Mutual Adaptation of Man and Machine in Control Systems) will be published in 1978. Psychologists from Bulgaria, the GDR, Poland, the USSR, and Czechoslovakia are

*This journal publishes articles in Russian, English, German, and French. Each article is accompanied by abstracts in Russian, English, and Slovak--*editor*.

**See the review of this collection in the journal *OBSHCHESTVENNYE NAUKI*, No 2, 1977--*editor*.

contributing to it. In particular, the Bulgarian scientists Yu. Marinov and P. Spasov have prepared interesting information generalizing research on information overloads and tiring of the human operator. I. Daniel', our colleague from Bratislava, has contributed the article "Psychological Analysis of Labor in Production Conditions," while Prof Y. Lingart from Prague has submitted the results of research on learning and thinking.

On the initiative of the USSR Academy of Sciences Institute of Psychology, the first conference of executives from psychological institutions in socialist countries was held in 1976; this conference had great significance to coordinating efforts in research on the general problems of psychology and to developing a program of joint research structured on a single methodological platform. Discussion of these issues was suggested in Moscow in July 1977, during the work of the Fifth Congress of the USSR Society of Psychologists. Guests to the congress from Bulgaria, Hungary, the GDR, Poland, and Czechoslovakia stated their desires in relation to joint publication of works on the state of psychology in socialist countries. They informed their Soviet colleagues about preparations for national psychological conferences scheduled to occur at the time of the 60th anniversary of Great October and devoted to the achievements of Soviet psychological science.

Contacts with psychologists in capitalist countries are developing actively. A protocol on cooperation between the USSR Academy of Sciences and the U.S. National Academy in 1977-1980 in experimental psychology has been signed. Cooperation is being maintained with colleagues from the American Council of Scientific Societies.

Correspondent: What, in your opinion, are the main tasks facing the institute's collective?

B. Lomov: In my opinion the next stage in the institute's work (as in the work of the country's other psychological centers) is associated chiefly with processing and gaining an understanding of the large masses of facts being accumulated in general, engineering, social, pedagogical, and medical psychology, in psychophysiology, neuropsychology, and in other areas of psychological science, and with analysis and generalization of their internal relationships and associations.

In other words we need to deepen development of the entire complex of psychology's methodological problems and the general methods and principles of psychological analysis implied by the dialectical materialistic definition of man's nature and his role in society. Preparation of fundamental scientific works revealing the laws governing physical phenomena and their nature, and of works providing a systematic illumination of the history, state, and perspectives of different areas of psychological science and the most pressing problems of psychological science is especially important in this connection. Of course a single scientific collective would be incapable of doing such work; it must be done by all of the country's psychological institutions. The task of our institute is to coordinate this work.

Life is making the task of training specialists capable of solving scientific-practical problems--pedagogical psychologists, engineering psychologists, and medical psychologists--very acute. In the next few years we must develop a program to train such specialists, and we must clearly define their functions, the range of problems, and the principles and methods of their solution.

To the institute's collective, the Tenth Five-Year Plan must become a period of growth in the quality of theoretical and experimental research, and of more-active inclusion of research results into the practice of communist construction.

Similar tasks also face psychologists in socialist countries. We have now been afforded all of the conditions for intensifying our ties and developing general research programs foreseeing detailed and deep study of the same pressing problems through the joint efforts of the psychologists of these countries. As I had mentioned earlier, we have experience in such cooperation within the framework of the CEMA ergonomics program. The job now is to make our cooperation even more purposeful and effective, to make cooperation in dialectical materialistic psychology truly scientific.

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SCIENTISTS AND SCIENTIFIC ORGANIZATIONS

FIRST ALL-UNION CONFERENCE ON ANIMAL RADIOECOLOGY

Moscow USPEKHI SOVREMENNOY BIOLOGII in Russian No 5, 1977 pp 315-317

[Article by A. I. Il'yenko]

[Text] This conference was held on the biology faculty of Moscow State University imeni M. V. Lomonosov on 24-27 January 1977. It was convoked at the initiative of the Institute of Evolutionary Morphology and Ecology of Animals imeni A. N. Severtsov, USSR AS [Academy of Sciences], the Scientific Council for Radiobiological Problems, USSR AS, the Biology Faculty of Moscow State University and All-Union Scientific Research Institute of Agricultural Radiology, USSR Ministry of Agriculture. There was a total of 190 specialists participating in the conference, who represented 72 organizations from 25 cities of the Soviet Union. At this conference, 184 papers were delivered.

In his opening remarks, K. M. RYZHIKOV (Department of General Biology, USSR AS) mentioned the rapid development of nuclear energy and increasing use thereof for peaceful purposes, and this puts to science problems pertaining to comprehensive and in-depth analysis of the consequences of such wide use of atomic energy. From this point of view, development of radioecological research is particularly important. With reference to the work done in our country in the field of animal radioecology, the speaker commented on its important role in providing a firm scientific foundation for extensive use of nuclear energy for peaceful purposes.

The most prominent radioecologists of our country delivered papers at the plenary session.

V. YE. SOKOLOV, A. I. IL'YENKO and R. M. ALEKSAKHIN (Institute of Evolutionary Morphology and Ecology of Animals, USSR AS, and All-Union Scientific Research Institute of Agricultural Radiology, USSR Ministry of Agriculture) devoted much attention to the historical bases and causes of inception and development of radioecological research in the USSR. They demonstrated convincingly that radioecology, in its current interpretation, emerged as an independent branch of ecology. The main feature of work done in recent years is the shifting of research to the study of behavior in the environment, with the

participation of plants and animals, of the radionuclides, the appearance of which in the biosphere is related to development of peaceful use of nuclear energy. At the present time, radioecology is developing on the basis of the scientific and methodological advances of modern biology, chemistry, physics and other sciences. Animal radioecology is one of the branches of radioecology. This is a rather differentiated discipline that is developing in several independent directions. The speakers raised a number of problems, as well as theoretical and practical prospects of development of modern directions of animal radioecology.

The paper of N. A. KORNEYEV (All-Union Scientific Research Institute of Agricultural Radiology, USSR Ministry of Agriculture) dealt with the main achievements and pressing tasks of agricultural radiology, which are determined by the significance of ionizing radiation dose loads on the final link of food chains, man. The author stressed that a large volume of information has been accumulated in the 20 years of development of animal radioecology with regard to the nature of migration of natural and artificial radionuclides in the biosphere and the effects of ionizing radiation on farm animals. Of all the radionuclides, the most information has been obtained concerning ^{90}Sr . Thus far, there has been insufficient study of the behavior of other anthropogenic radioactive elements in agricultural chains, and no quantitative forecasts of intake thereof in the human body have been made. It is a pressing task for radioecology to evaluate the effects of these radionuclides on agricultural objects. The following are the most pressing tasks for modern agricultural radioecology of animals: investigation of metabolic patterns of a number of natural and artificial radionuclides in the organism of farm animals; investigation of the question of combined effect on animals of other ecological factors, against the background of ionizing radiation, and of the set of natural conditions on passage of radioactive substances into agricultural products; development of measures to protect agricultural production from radioactive contamination.

I. A. SHEKHANOVA (All-Union Scientific Research Institute of Fisheries and Oceanography, USSR Ministry of the Fish Industry) stressed the need for setting ecological standards for levels of artificial radionuclides in reservoirs to preserve fish resources and create optimum conditions for reproduction of these resources. At the present time, the concentration of ^{90}Sr is as follows (pCi/l): 0.1-0.2 in oceans; 0.5-1.5 in inland and outlying seas; 1.5-5.0 in rivers and 3.5-12.0 in lakes. In some reservoirs, where the radioactive waste from atomic plants accumulates, the overall level of β -emitting nuclides ranges from 25 to 200 pCi/l. There is a particularly high concentration of some radionuclides, including ^{137}Cs , in deposits at the bottom of reservoirs. The speaker defined the critical doses of ionizing radiation, with which disturbances appear in embryogenesis, resistance to parasitic and infectious diseases, changes in hemopoiesis, reproductive function and endocrine system of fish.

In his paper, YU. B. KUDRYASHOV (Biology Faculty, Moscow State University) reported that, in recent years, some representatives of wild rodent species

have been found to have unusual resistance for this class of animals to the deleterious effects of ionizing radiation. Data on the high radioresistance of these mammals, which inhabit areas with a high background of artificial radioactivity, were of great interest to radioecologists. At the present time, two directions of research on the causes of high natural radioresistance have been delineated: determination of factors, both ecological that affect radioresistance and endogenous (biochemical and biophysical) that determine the background of stable level of radioresistance. Determination of ecological factors led to a search for plants that are consumed by radioresistant rodents capable of having a radioprotective effect. This research is of particular radioecological interest, since it permits the pursuit of a purposeful search for means of protection against radiation.

N. V. KULIKOV (Institute of Plant and Animal Ecology UNTs [expansion unknown], USSR AS) dwelled on the advantages of atomic power plants over electric plants using organic fuel, which pollute the environment; but he stressed that rapid development of nuclear power engineering will lead to a significant elevation of the level of radioactive waste dumped in the biosphere. Moreover, hundreds of millions of cubic meters of water will be required to eliminate excessive heat through the cooling systems of atomic power plants. In areas where radioactive substances are dumped into coolant reservoirs, the effects of ionizing radiation will be enhanced against the background of heated water and mechanical trauma to hydrobionts. In the author's opinion, the principles of setting ecological standards for levels of radioactive substances in reservoirs, with due consideration of the reservoir as an integral ecological system, must be worked out in the next few years. It is also important to define the critical food chains that are directly or indirectly related to the human body and to outline the means of breaking them if necessary.

The paper of G. A. NOVIKOV (Biology Faculty, Leningrad State University), which dealt with experience in teaching radioecology, indicated that the range of issues constituting the subject of this discipline, which have become so pressing in our times, should be appropriately reflected in the teaching process on biology faculties of VUZ, where a mandatory course on environmental protection is provided. The author stressed that it is all the more important to teach radioecology in conjunction with ecological disciplines, since the importance of this discipline is often underestimated.

Meetings dealing with problems, which were held during the conference, were helpful in discussing a number of issues that are specific to various directions of animal radioecology.

Farm animals: Here, attention was given primarily to the following: metabolic patterns in the organism of productive animals; migration of nuclides and chemical analogues thereof in food chains and passage into animal industry products; effects on the organism of a mixture of young fission products and various radionuclides on hemopoietic organs and immunological reactivity. There was a discussion of the principles of setting standards of intake of radioactive substances by animals and other questions.

Fresh-water animals: There was discussion of the patterns of concentration by hydrobionts (chiefly various species of fresh-water fish) of radionuclides, depending on ecological living conditions: trophism of reservoirs, ambient temperature, feed; role of aquatic birds in transporting radioactive elements from fresh-water reservoirs, etc. Many papers dealt with the effects of radionuclides and ionizing radiation on invertebrate aquatic animals.

Terrestrial animals: A total of nine papers was delivered on this topic. They included reports on the distinctive features of rodent life in areas with a naturally high background of radiation by members of the staff of the Institute of Biology, Komi Branch of USSR AS.

We detect an increased interest on the part of researchers in the problem of natural resistance of mammals to the effects of ionizing radiation. The facts submitted in the papers on animal radioresistance and its mechanisms constitute a valuable contribution to comparative radioecology and understanding of the effects of ionizing radiation on populations of organisms of different species and inhabitants of different natural regions.

Extensive data, gathered from experiments on various species of laboratory animals, were submitted in papers dealing with radioecological patterns of effects of external and internal sources of radiation. There was also mention of the wide use of radioactive tracers and radionuclides for the study of animal ecology. This method gained wide use in studies of endemic sites of infections that are hazardous to man. It is possible to learn the distinctions of nesting conservatism by using radioactive tags on populations of aquatic birds that build open nests.

The discussion of the results of the conference made it possible to outline several pressing subjects of research in the field of animal radioecology. To resolve these problems and coordinate research in our country, it would be expedient to assign one of the scientific institutions of the USSR AS as the chief institution, as well as to organize a scientific society of radioecologists under the Presidium of the USSR AS.

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SCIENTISTS AND SCIENTIFIC ORGANIZATIONS

ACCOMPLISHMENTS OF BULGARIAN INSTITUTE OF ZOOLOGY DISCUSSED

Moscow ZOOLOGICHESKIY ZHURNAL in Russian No 10, 1977 pp 1586-1588

[Article by B. Botev and V. Golemanski: "The 30th Anniversary of the Institute of Zoology of the Bulgarian Academy of Sciences"]

[Text] The 30th anniversary of the establishment of the Institute of Zoology under the Bulgarian Academy of Sciences occurred on 19 February 1977. This is one of the first scientific research institutes established by the Bulgarian Government after the liberation of the country on 9 September 1944. A modest collection of stuffed commercial animals and birds organized in Sofia in 1892 marked the beginning of the Institute of Zoology. This was supplemented and grew into the Museum of Natural History. However, scientific research in the field of zoology began much later, after 1914, when Dr Ivan Buresh, a young Bulgarian zoologist, became the museum's director. In 1919 the Museum of Natural History already had three divisions--zoological, botanical and mineralogical--in which active scientific work was conducted.

The Institute of Zoology was established on the basis of the zoological division of the Museum of Natural History in Sofia, which in 1947 had only 20 workers. During the years of the people's rule, over the 30-year period of its existence, the institute was transformed into a sizable scientific institution, where 14 professors and senior scientific workers, 53 scientific workers and 33 people on the scientific-auxiliary and administrative staff now work.

In 30 years the Institute of Zoology underwent three basic stages. At the first stage (1947-1959) it did not have a specialized structure. Taxonomic, faunistic and zoogeographical investigations of Bulgarian fauna were primarily conducted. During that stage the multivolume series "Fauna Bolgarii" [Bulgaria's Fauna] was initiated and its first three volumes--P. Patev "Ptitsy Bolgarii" [Bulgaria's Birds] (1950), P. Drenski "Ryby Bolgarii" [Bulgaria's Fish] (1951) and G. Markov "Nasekomoyadnyye Mlekopitayushchiye Bolgarii" [Bulgaria's Insect-Eating Mammals] (1957)--were published.

The second stage (1960-1972) is characterized by an expansion in the subjects and volume of scientific research. Four sections--invertebrates and hydrobiology, entomology, parasite fauna and vertebrates--are singled out. Faunistic investigations expand in the country and systematic regional investigations of land fauna in several regions in the country (Frakiya, Stara Planina, Rodopy, the Black Sea coast and so forth) begin. The hydrobiological study of Bulgarian continental reservoirs and underground water expands. Investigators embark on an ecological investigation of Bulgarian land fauna.

The third stage begins in 1972, when the Institute of Zoology is reorganized according to the problem principle and enters into close scientific contacts with the departments of zoology and ecology of the Biological Faculty of Sofia University. Four sections--taxonomy, faunistics and zoogeography, ecology of land animals, hydrobiology and ontogenesis and morphogenesis of animals--are established.

An all-around study of Bulgarian fauna in taxonomic, faunistic and ecological directions has been the institute's main task since its foundation. The development of principles of a correct use and protection of the country's animal resources is one of the main tasks of these investigations. Simultaneously with traditional taxonomic and faunistic investigations, ecological investigations of Bulgarian fauna in accordance with the problems connected with the maintenance of a biological balance in nature, protection and reproduction of animals of the country's genetic stock and search for methods of biological control of pests and parasites have acquired ever greater importance recently. Investigations of the ontogenesis and morphogenesis of animals, saprobiology of Bulgarian rivers and toxicology of water organisms are also developed.

During the 30-year period large-scale scientific research was conducted in the field of taxonomy and zoogeography of groups of animals most important from the practical point of view and widespread on Bulgaria's territory. Mammals, birds, reptiles, amphibians and fish, some individual groups of invertebrates, for example, arachnids, myriapods, segmented worms and some orders of crustaceans and insects (frenate lepidopterons, orthopterons, dipterons, lepidopterons and so forth) were studied comparatively well and completely. Most of these investigations were published in the multivolume series "Fauna Bolgarii" and in "Trudy Instituta Zoologii" /Proceedings of the Institute of Zoology/.

One can judge the scale and importance of the taxonomic and faunistic investigations conducted in the Institute of Zoology from the following generalized figures. Bulgarian zoologists described more than 400 taxa new for science, including 2 new families, 7 subtribes, 35 new genera and more than 500 new species. New species were described not only from Bulgaria's territory, but also from many countries of Europe, Africa, Asia and South America. During that period Bulgarian zoologists wrote more than 670 scientific articles, 470 of which were published in the institute's press organs and more than 200, in 41 scientific journals of other countries.

A large number of unicellular and multicellular parasites of animals and man of great agricultural and medical importance were studied in the Institute of Zoology. The Coccidia of a large number of wild birds and game animals (hare, mouflon, foxes, squirrels and so forth), as well as the parasitological protistofauna of a number of Bulgaria's commercial fish (carp, trout, white Amur fish, silver carp and so forth), were investigated. Scientifically substantiated methods of preventing and controlling unicellular parasites of economically valuable species of animals were developed. A large number of multicellular parasites of animals and man of veterinary and medical importance (bird lice, blood sucking flies and mosquitoes, fleas, mites, certain groups of helminths and so forth) were studied. With due regard for the solution of practical problems of public health the Institute of Zoology organized overall expeditions (with the participation of specialists of medical and veterinary institutes) for the study of the natural foci of diseases in two regions of South Bulgaria. The results of these investigations were published in two collections.

The study of the spread of various species of animals made it possible to make a number of zoogeographical generalizations concerning not only the fauna of Bulgaria, but also of the Balkan Peninsula as a whole and certain Palearctic regions. On the basis of the study of cave fauna a biospeleological regionalization of the Balkan Peninsula was made and the role of Agaeids in the formation of Mediterranean cave fauna was clarified. The attempt to clarify the role of the postglacial fault of the areas of some species of insects in the processes of species formation in the Mediterranean subregion is an important result of the zoogeographical investigations. Interesting zoogeographical data were accumulated on the endemic species of animals, Mediterranean elements and glacial relics on Bulgaria's territory.

Hydrobiological investigations play an important role in the institute's activity. Begun as ichthyological investigations, they have now expanded considerably and include problems connected with the dynamics of fish populations, the structure of the zooplankton and benthos of Bulgarian continental reservoirs, saprobiology of Bulgarian rivers and so forth. The hydrobiological characteristics of high-mountain rivers were investigated and certain patterns in the biological processes occurring in them were clarified, which makes it possible to forecast their further development.

The institute's hydrobiologists conducted large-scale scientific research in the field of hydrology, hydrochemistry, the composition of flora and fauna, the genesis and formation of the biocoenoses of reservoirs and the suitability of their water for economic needs. As the final result, these investigations made it possible to develop measures for an overall use of reservoirs and the derivation of the maximum benefit from their biological resources.

As a result of the investigations of the Bulgarian sector of the Danube conducted over many years the composition, qualitative and quantitative distribution and seasonal and annual dynamics of the plankton and benthos organisms of the river and of the reservoirs connected with it were established.

These investigations made it possible to clarify the importance of zoo-benthos in the feeding of some species of benthic fish and in the destruction of coasts and also to determine certain interesting biological characteristics of Danube organisms. The institute's specialists prepared a forecast of the change in the biological regime of the Danube after the construction of the Nikopol'-Turnu Mygurele Hydraulic Power System and proposed practical measures for its commercial fish exploitation.

Ecological investigations of Bulgarian land fauna developed weakly for a long time. In connection with this the institute began working out ecological problems together with the Institute of Ecology of the Polish Academy of Sciences. The establishment of a section for the ecology of land animals in the institute in 1972 was a reflection of the intensified investigations in this direction. Investigations of the population structure, population, biomass and rates of reproduction and productivity of the most important species of rodents in beech and spruce ecosystem of two mountain areas were conducted during the short time of the section's existence. The structures and dynamics of the populations of coprobiont dipterous insects and beetles in pasture ecosystems were studied.

For the purpose of solving the practical tasks of protecting the natural environment, investigations of the effect of certain large industrial enterprises on the animal population have been undertaken in the institute in the last few years. Such investigations are of great importance for forecasting the changes in the environment during the development of plans in the construction of industrial facilities.

Investigations of the individual development and morphogenesis of animals have also been conducted in the Institute of Zoology as of 1972. The cellular differentiation, morphogenesis and development of the antigenic structure in the ontogenesis of vertebrates are investigated. A stable cellular culture of chemically induced malignant tumors in rodents was obtained and changes in the morphology, mitotic cycles and proliferative activity of its cells under conditions of prolonged cultivation were described.

The Institute of Zoology maintains scientific contacts with many scientific research institutes in the country and abroad. In connection with bilateral and multilateral scientific cooperation, including within the framework of the CEMA, the institute worked out a large number of scientific research subjects and problems together with the institutes of ecology and zoology of the Polish Academy of Sciences, the Institute of Parasitology of the Czechoslovak Academy of Sciences, the Institute of Marine Investigations of the Polish Academy of Sciences, the Institute of Evolutionary Morphology and Ecology of Animals of the USSR Academy of Sciences, the Federal Institute of Water of the Austrian Academy of Sciences and so forth. Especially fruitful scientific relations exist between the specialists of the Institute of Zoology and the scientific workers of the Zoological Institute of the USSR Academy of Sciences, the Institute of Hydrobiology of the Ukrainian SSR

Academy of Sciences and the Institute of Cytology of the USSR Academy of Sciences. In the last 20 years alone more than 30 scientific workers of the Institute of Zoology were sent on missions for various purposes to the institutions mentioned. The following prominent Soviet scientists visited the Institute of Zoology during various years: Ye. N. Pavlovskiy, M. S. Gilyarov, K. I. Skryabin, L. A. Zenkevich, G. Ya. Bey-Biyenko, V. I. Zhadin, G. M. Belyayev, A. P. Markevich, Yu. I. Polyanskiy and others.

The printed publications of the Institute of Zoology in the last 30 years are very significant. A total of 41 volumes of the periodical organ IZVESTIYA NA ZOOLOGICHESKIY INSTITUT S MUZEY were published before 1974 and regularly sent to more than 30 biological libraries of all continents. As of 1974 the institute published three new specialized scientific series: ACTA ZOOLOGICA BULGARICA, GIDROBIOLOGIYA and EKOLOGIYA. The Institute of Zoology also publishes the series "Trudove Na Zoologicheskaya Institut," collections on Bulgaria's regional fauna, a popular science series and so forth. The fundamental series "Fauna Bolgarii" is of especially great importance for Bulgarian science and practice. After the above-mentioned first three volumes published in the 1950's, six new volumes were accepted for publication, two of them already being on sale: "Sukhozemnite Okhlyuvi v B"lgariya" [Land Snails in Bulgaria] by S. Damyanov and I. Likharev (1975) and "Khobotnitsite v B"lgariya" [Proboscidian Insects in Bulgaria], part 1, by P. Angelov (1976). According to the long-term plan for the publication of "Fauna Bolgarii," another eight volumes will be sent to the press before the end of 1980. A more intensive publication of this series became possible owing to the enlistment of a wide range of specialists in the appropriate taxonomic groups as authors. Not only the specialists of the Institute of Zoology, but of other scientific research institutes in Bulgaria, have become the authors of these studies. One of the new volumes already published is the fruit of cooperation between Bulgarian and Soviet specialists.

The result of the 30 years of activity of the Institute of Zoology of the Bulgarian Academy of Sciences is a guarantee for its successful development in the future in accordance with the present needs and requirements of socialist Bulgaria.

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